

SELF-DETERMINED MOTIVATIONAL EXPERIENCES FOLLOWING PA

A Comparison of Self-Determined Motivational Experiences
Between Participants and Non-Participants Following the Physical Activity
Component of the CATCH Kids Club

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Abstract

The CATCH Kids Club (CKC) is an after-school intervention that has attempted to address the growing obesity and physical inactivity concerns publicized in current literature. Using the Self-Determination Theory (SDT: Deci & Ryan, 1985) perspective, this study's main research objective was to assess, while controlling for gender and age, if there were significant differences between the treatment (CKC program participants) and control (non-CKC) groups on their perceptions of need satisfaction, intrinsic motivation and optimal challenge after four months of participation and after eight months of participation. For this study, data were collected from 79 participants with a mean age of 9.3, using the Situational Affective State Questionnaire (SASQ: Mandigo et al., 2008).

In order to determine the common factors present in the data, a principal component analysis was conducted. The analysis resulted in an appropriate three-factor solution, with 14 items loading onto the three factors identified as autonomy, competence and intrinsic motivation. Initially, a multiple analysis of co-variance (MANCOVA) was conducted and found no significant differences or effects ($p > 0.05$). To further assess the differences between groups, six analyses of co-variance (ANCOVAs) were conducted, which also found no significant differences ($p > 0.025$).

These findings suggest that the CKC program is able to maintain the self-determined motivational experiences of its participants, and does not thwart need satisfaction or self-determined motivation through its programming. However, the literature suggests that the CKC program and other PA interventions could be further improved by fostering participants' self-determined motivational experiences, which can lead to the persistence of healthy PA behaviours (Kilpatrick, Hebert & Jacobsen, 2002).

Dedication

“Everyone wants to live on top the mountain.

But all the happiness and growth occurs while you’re climbing”

– Anonymous

To my mother, who lived this message, through hardship and pain, and kept climbing.

So proud mom!

To my father, who carried me through the tough passes of *my* climb.

And to God, for never leaving my side, especially when things got rough.

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SELF-DETERMINED MOTIVATIONAL EXPERIENCES FOLLOWING PA

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Table of Contents

CHAPTER 1	1
Introduction	1
Statement of the Problem	12
Purpose of the Study	12
Need for the Study	13
Delimitations	14
Limitations	14
Assumptions	16
Research Questions	16
Definition of Terms	16
CHAPTER 2	19
The Child and Adolescent Trial for Cardiovascular Health – An Overview	19
<i>Figure 1. Overview of the CATCH-ON Study Design</i>	25
The After-School Setting	28
The CATCH Kids Club	30
The Established Research Methods of the CATCH and CKC Studies	32
Self-Determination Theory – An Overview	35
<i>Figure 2. The Self-Determination Continuum</i>	38
The Situational Affective State Questionnaire	43
The Importance of Competence, Autonomy and Relatedness . . .	46
The Effect of Gender and Age on Competence, Autonomy and Relatedness	48
CHAPTER 3	51
Design of the Study	51
Arrangements for Conducting the Study Including Research Ethics	52

SELF-DETERMINED MOTIVATIONAL EXPERIENCES FOLLOWING PA

Instrumentation	53
Procedures for Testing and Gathering Data	55
Treatment of the Data	56
CHAPTER 4	58
Data Analysis	58
Data Screening	58
Background Demographics	60
The Situational Affective State Questionnaire (SASQ)	60
The Constructs of the SASQ	65
An Analysis of Subjective Experiences	72
Summary of Findings	81
CHAPTER 5	83
Introduction	83
Research Objective One – Principal Component Analysis	83
Research Objective Two – Analysis of Subjective Experiences	87
Limitations	93
Recommendations for Future Research	94
Conclusion	96
References	98
Appendix A: The Situational Affective State Questionnaire (SASQ)	116

List of Tables

<i>Table 1.0</i> – Background Demographics	61
<i>Table 1.1</i> – Mean scores for Perceived Autonomy items	62
<i>Table 1.2</i> – Mean scores for Perceived Competence items	63
<i>Table 1.3</i> – Mean scores for Perceived Relatedness items	63
<i>Table 1.4</i> – Mean scores for Intrinsic Motivation items	64
<i>Table 1.5</i> – Mean scores for Optimal Challenge items	65
<i>Table 1.6</i> – Summary of items and factor loadings for five-factor solution . . .	68
<i>Table 1.7</i> – Summary of factor loadings for three-factor solution . . .	70
<i>Table 1.8</i> – Mean scores for SASQ constructs	71
<i>Table 1.9</i> – Multiple analysis of covariance of three SASQ construct scores . . .	75
<i>Table 2.0</i> – Analysis of covariance for the four month treatment versus four . . .	78
<i>Table 2.1</i> – Analysis of covariance for the eight month treatment versus eight . . .	79
<i>Table 2.2</i> – Summary of all written responses to SASQ	80

List of Figures

<i>Figure 1.</i> Overview of the CATCH-ON Study Design	25
<i>Figure 2.</i> The Self-Determination Continuum	38

Chapter 1

Introduction

In 2005 the World Health Organization's (WHO) projections indicated that there were 1.6 billion overweight adults (aged 15+) and 400 million obese adults in the world (WHO, 2006). These numbers, when totalled, showed that approximately 2 billion or 31% of the world's population was overweight or obese in 2005. As a result, the WHO has declared that there is a global epidemic of obesity, and further observed that "the prevalence of obesity is rising not only in western countries such as the United States, the United Kingdom, Australia, Germany, the Netherlands, Sweden, and Finland, but also in countries such as Brazil, China and Israel" (Le Petit & Berthelot, 2005, p. 1). Even more troubling are the projections, which indicated that at least 20 million children under five years of age are overweight (WHO, 2006).

On a North American level, in the United States only 5% of children aged 6-12 were overweight between 1976 and 1980 (National Center for Health Statistics, 2005). This percentage increased to 10.1% from 1988 to 1994, and again to an astounding 16.1% between 1999 and 2002 (National Center for Health Statistics). The same is true in Canada. The 2004 Canadian Community Health Survey (CCHS) found that of Canadian children and youth aged 2-17 years of age, over a quarter (26%) were overweight or obese (Shields, 2005). This percentage has more than doubled over the past 25 years (Shields). This is particularly problematic in Ontario as the provincial rate

in 2004 for obese/overweight youth aged 2-17 was above the national level at almost 28% (Shields & Tjepkema, 2006).

Researchers have now begun to identify the many risk factors that can contribute to childhood obesity. Dietz and Gortmaker (2001), for example, have each developed similar models examining the effect of biological factors. These models outline two key mechanisms that have led to an increase in childhood obesity: the balance of (1) dietary intake and, (2) physical activity (PA) levels (Dietz & Gortmaker). Obesity occurs when the intake of energy is not balanced with the expenditure of energy (Dietz & Gortmaker). Other researchers have examined environmental factors to explain this energy imbalance in youth. In recent decades, food advertising and widespread access to calorie-dense food has increased dramatically, which has corresponded with automated labour saving devices and a decrease in participation in PA and active leisure activities (Dietz & Gortmaker; Tremblay & Willms, 2003). Another contributor to the childhood obesity epidemic is the increase in screen time during children's leisure time. Numerous studies have shown that increases in video game and television viewing time are directly, and positively, associated with overweight or obesity in children and can even stimulate excessive eating and sedentary behaviour (Dietz & Gortmaker, 1985; Janssen, Katzmarzyk, Boyce, King, & Pickett, 2004; Tremblay & Willms, 2003). The likelihood of PA in extracurricular settings has also been associated with socioeconomic factors such as family structure and family income (Guevremont, Findlay & Kohen, 2008). All of these factors, when combined, have led to the current childhood obesity problem, which can have adverse and long lasting effects on today's youth.

Research has shown that childhood obesity can lead to many adverse effects, including decreased physical, social and psychological health (Dietz, 1998; WHO, 2002). The WHO confirmed that children who are obese may experience adverse metabolic effects on blood pressure and cholesterol, as well as increased chances for developing Type II Diabetes, cancers or coronary heart disease. Dietz found that the most widespread consequences of childhood obesity are psychosocial. Numerous studies in the 1960s (Richardson, Goodman, Hastorf & Dornbusch, 1961; Stunkard & Burt, 1967) found similar adverse social and psychological effects. These results continue to be found in current research. In 2005, Mahoney, Lord and Carryl again reported social consequences of childhood obesity as they found that obese children experienced lower peer acceptance than non-obese children. Research further shows that it is very important to address obesity during childhood as longitudinal data indicates that “once an adult is overweight, further weight gain is likely and very few lose enough weight to return to the normal weight range” (Shields, 2006, p. 38). Studies by Dietz and Gortmaker (2001), and Clarke and Lauer (1993) mirror these findings, having discovered that the majority of overweight adolescents go on to become overweight adults.

Childhood obesity also has economic consequences. The Canadian Fitness and Lifestyle Research Institute found that if there was a 1% increase in the population of physically active Canadians in 1993, the Canadian health care system could have saved 10 million dollars, which was instead spent treating heart disease (The Conference Board of Canada, 1996). Another \$900 000 could have been saved in treatments for Type II Diabetes (The Conference Board of Canada). In 1997, the total cost of obesity in Canada

was estimated to be near \$2 billion a year, and accounted for approximately 2.5% of the total health care expenditures that year (Lau, Douketis, Morrison, Hramiak & Sharma, 2007).

To combat obesity and the associated health issues, many researchers suggest PA as a necessary component of the solution. In a review of PA and childhood obesity research, Steinbeck (2001) found there is general agreement in the literature that children with established obesity are less likely to participate in moderate or vigorous exercise, and data supports that lower PA levels and sedentary behaviours are associated with a higher prevalence of obesity in children. Tremblay and Willms (2003) provided specific evidence of the relation between PA and childhood obesity as the results showed that Canadian youth aged 7-11 who participated in both organized and non-organized sport and PA had a 10-24% reduced risk of being overweight and 23-43% reduced risk of being obese. The quality of a child's PA experiences is also an important component of the solution. When children find their PA experiences enjoyable and rewarding, they are more likely to engage in future PA behaviours, both tomorrow and into adulthood (Sallis & McKenzie, 1991). Because of findings such as these, many research studies have incorporated PA into their interventions to improve children's health behaviours. In Steinbeck's (2001) review, a number of school-based interventions include PA, and have shown promising results.

The school setting has begun to be a staging point for many interventions addressing the physical inactivity of youth and the childhood obesity epidemic.

“Children spend the majority of their waking hours in school or school related activities, making these institutions ideal locations for diet and exercise education and intervention strategies” (Boon & Clydesdale, 2005, p. 512). In a review of obesity prevention interventions, Sharma (2006) found that the majority of interventions were in the elementary or lower middle school setting. This “makes sense because the dietary and PA behaviours are beginning to get formed in these years and interventions designed to alter modifiable PA and nutrition behaviours at this juncture can go a long way” (Sharma, p. 266). In fact, Steinbeck (2001) found that there are two cohorts of children who are prime candidates for inclusion in these interventions. She observed that the adiposity rebound in pre-puberty and adolescence are the two periods in childhood development when children are at an increased risk of obesity and could benefit greatly from interventions and obesity prevention strategies (Steinbeck). These school based interventions have shown the ability to establish and foster healthy dietary and exercise patterns during these vulnerable periods and research shows that these positive health behaviours may persist into adulthood (Annesi, 2006; Sharma, 2006).

In response to this obesity epidemic, and the declining PA patterns in today’s youth, numerous school and after-school based interventions have been designed to reduce or prevent childhood obesity, Type II Diabetes, and cardiovascular disease, and increase PA. Founded on empirical evidence, the Child and Adolescent Trial for Cardiovascular Health (CATCH) was a study conducted to address these health issues of youth. This study became the “largest school-based education study ever funded in the United States” (Hoelscher et al., 2004, p. 595). Initially, CATCH I was first conducted as

a three year pilot phase (Osganian, Parcel & Stone, 2003). The main trial (CATCH II) was a field study that implemented a multi-component intervention in 96 schools to 5106 students (Luepker et al., 1998). The intervention included four program elements which addressed: (1) school food services; (2) physical education; (3) school curriculum including eating behaviours, PA patterns and tobacco use prevention; and (4) home curriculum including fun nights and activity packets to be completed at home (Luepker et al.). The data in this study was gathered from the fall of 1991 to the spring of 1994 and made two important discoveries at the school level (Luepker et al.). The CATCH II study showed that the intervention was able to: (1) increase the moderate to vigorous physical activity (MVPA) of students in physical education classes to 40% of the total class time; and (2) decrease the total fat and sodium content of school lunches (Luepker et al.).

A follow up study (CATCH-ON) was conducted five years post intervention using the schools from the main trial while also gathering data from control schools. The CATCH-ON study found that in those schools that had received and practiced the curriculum-based intervention, the Eat Smart program (school food service) and the physical education component (CATCH PE), the intervention had become more institutionalized within the school (Hoelscher et al., 2004; McKenzie et al., 2003; Osganian, Parcel & Stone, 2003). The CATCH-ON study also found that the sustained intervention had maintained the increased PA levels and class energy expenditures that were reported during the initial study. The positive results of these studies led to the

development of the Coordinated Approach to Child Health (CATCH), a program that has now been instituted in many schools across the United States of America.

Some studies have shown that although children are forming their PA behaviours in school settings, they acquire most of their PA in non-school environments (Ross et al., 1985). The after-school environment therefore, a space rich with sports and physically active opportunities, is an excellent space to promote PA. Unfortunately, research has found that overeating and related sedentary behaviours occur commonly during non-school hours (Crawford et al., 2001) and the number of Canadian youth aged 12 to 21 who participate in organized sport at least once a week has decreased by 6%, from 44% to 38%, between the years of 2002 to 2003 alone (Statistics Canada, 2003). This is compounded by findings from the Canadian Fitness and Lifestyle Research Institute (2000) which indicate that children's PA begins to decline by the age of 12. These numbers justify an examination of the after school setting as a space for interventions, a strategy also being promoted by many researchers. Studies have suggested that an exclusive focus during school physical education class is misplaced and research needs to be directed towards other settings as well (Annesi, 2006). Koplan, Liverman and Kraak (2005) affirm that a growing body of research examining the decline in PA patterns in youth needs to be met in schools by a reintroduction of an after-school PA program.

The CATCH Kids Club (CKC) is a recently developed after-school program adapted from the school-based CATCH program. When implemented into an after-school setting the CKC has three program elements designed to improve PA and provide

nutrition education, similar to CATCH. The CKC includes a five module education element, a PA component, and a healthy snack component. Each component is divided into developmentally appropriate activities. Initially, the CKC program has proven successful, as demonstrated by a pilot study conducted in Texas in 2005 (Kelder et al., 2005). Kelder et al. examined 157 students who participated in a 5 month pre-test and post-test study examining self-reported food intake and PA, direct observation of PA during free play time and focus group interviews with program staff. The study found that the after-school intervention program reduced unstructured free time by 64 minutes and increased game play by 30 minutes; secondly, it increased youth's MVPA levels to 56.8% compared to the reference group, which engaged in MVPA only 31.3% of the time; and thirdly, it increased youth's food knowledge (Kelder et al.).

Within both the CATCH (Luepker et al., 1998) and CKC (Kelder et al., 2005) studies, numerous measures were used to assess the effectiveness of these programs. The System for Observing Fitness Instruction Time (SOFIT) is a validated instrument used in these studies to measure the quality of the PA programs, specifically the type and intensity of the youth's activities and the behaviours of the PA leader during fitness time (Luepker et al.; Kelder et al.). SOFIT uses direct observation to simultaneously measure the lesson context and the youth's PA levels. Thus, SOFIT is able to assess the percentage of time spent in MVPA during the fitness period as well as calculate the time spent providing instruction versus actual game play (Kelder et al.). By assessing the MVPA of youth in these programs, researchers are able to identify programs and components that result in increases in energy expenditure. While this is valuable

knowledge, it is also important to assess the quality of the PA experience leading to increased energy expenditure. Measuring the affective experiences of children can be evidence for why these programs are effectively increasing PA, and can provide knowledge for how to ensure healthy PA behaviours are fostered through these programs during childhood, as childhood patterns have been shown to persist over a complete lifespan. Research has further shown that it is important to identify childhood motivations, as certain kinds of motivations can be directly linked to the adherence and maintenance of PA behaviours (Fredrick-Racascino, 2002).

Self-Determination theory (SDT: Deci & Ryan, 1985) is one theory that can provide a framework for understanding the quality of children's PA engagement (Ryan & Deci, 2000a). SDT is an organismic theory that attempts to understand human motivation and personality (Ryan & Deci, 2000b; Deci & Ryan, 2002). SDT is based on the assumption that there are three innate psychological needs, the need for competence, autonomy, and relatedness (Ryan & Deci, 2000b). SDT proposes that children function and develop effectively and healthily if they engage in social environments that have the potential to satisfy these three needs. The satisfaction of these needs can bring about different forces or types of motivation, which SDT organizes along a continuum. This continuum ranges from completely self-determined (intrinsic motivation) to non-determined or amotivated (Deci & Ryan, 1985). Research in various life contexts such as education, work, interpersonal relationships, and leisure has shown that the most positive outcomes result from the most self-determined forms of motivation (Vallerand & Bissonnette, 1992; Vallerand & Losier, 1999). It is important to further study these self-

determined motivations, and the needs of competence, autonomy and relatedness, as studies have shown that those who participate in PA are more likely to self-regulate their behaviours and adhere to participation in an activity if they experience self-determined motivations such as enjoyment, competence and social interaction (Ryan & Deci, 2000b; Ryan, Fredrick, Lepas, Rubio & Sheldon, 1997). Research has also found that self-determined motivations that provide enjoyment and satisfy the needs for competence, autonomy, and relatedness are predictors of higher quality PA experiences and predict maintenance of healthy PA behaviours (Thorgersen-Ntoumani & Ntoumanis, 2006).

As stated earlier, satisfaction of the needs of autonomy, competence and relatedness is necessary for the growth and well-being of children (Ryan & Deci, 2000b). Children “are born with a need to pursue activities because they are interesting or fun” (Poulsen, Rodger & Ziviani, 2006, p.79). When a child chooses to engage in intrinsically motivated activities due to their curiosity, interest, enjoyment and search for challenge, they are able to satisfy their need for autonomy. Likewise, when a child feels a sense of success or competence during PA participation, they are more likely to persist in that activity (Papaioannou et al., 2006). When engaging in PA, a child will also be more willing to explore and engage in new or diverse activities when there is the presence of support, warmth and affection from others in the environment (Poulsen, Rodger & Ziviani). Thus, need fulfillment during PA participation is essential to providing quality PA experiences for children, and as the literature demonstrates, can maintain or increase the physically active persistence of a child.

In order to study the impact of the PA component of the CKC on participants' levels of self-determination, the Situational Affective State Questionnaire (SASQ; Mandigo, Holt, Anderson & Sheppard, 2008; see Appendix A) can be used. Based on the postulates of SDT, this questionnaire assesses the level of self-determination on five subscales. The SASQ is a participant self-report tool, assessing optimal challenge, intrinsic motivation, perceived competence, perceived autonomy and relatedness. Participants indicate their level of agreement with a series of motivation-related statements on seven-point Likert scales ranging from "no way" to "for sure" (Mandigo, Holt, Anderson & Sheppard). Utilizing a process measure to examine PA levels, and supplementing it with an examination of children's motivational experiences after PA (SASQ) can provide new and useful information. Conducting this research in the after-school setting may provide a unique perspective of children's' motivational experiences, as children have been shown to feel more challenged and find more enjoyment in the after-school setting then during school hours (Larson, 2000). Ensuring children engage in quality PA experiences in the after-school setting is also very important as the restrictions of the school day are continuing to limit the opportunity for children's PA involvement; and research has shown that children will not compensate by increasing their PA levels after school, by choice (Dale, Corbin & Dale, 2000). Research comparing control versus treatment groups, and using post intervention measures could help determine how children's level of self-determined motivation in PA interventions varies in the after-school setting, and identify successful interventions that can foster self-determination, leading to prolonged and healthy lifestyles for children.

Statement of the Problem

The present study is part of a larger research project with the overall goal of examining changes in children's healthy behaviours as a result of participation in the CKC program. Grounded in Self-Determination Theory (Deci & Ryan, 1985), this study investigated children's motivational experiences arising from participation in the PA component of the CKC program in an effort to assess if the CKC program is an effective intervention for increasing self-determined behaviours. The focus of this research was to assess the degree of optimal challenge, intrinsic motivation, perceived competence, perceived autonomy and relatedness experienced by the participants immediately after participation in the PA component. This information will provide a more complete understanding of what children's affective reactions are to the PA component of the CKC program and provide possible strategies to encourage further development of self-determined motivation in the PA component of the program.

Purpose of the Study

The effectiveness of the school-based CATCH program has been thoroughly studied in the United States of America (Hoelscher et al., 2004; Luepker et al., 1998). However, there is not an extensive body of scientific knowledge concerning the outcomes of the after-school CKC program, and even less research concerning CKC in a Canadian setting. This study addressed this gap in the research by examining the CKC program in a Canadian after-school childcare setting. This research also attempted to strengthen the literature concerning the relationships between self-determined motivations and PA in

children. Finally, this information may provide further insight into the link between motivations and youth inactivity as well as possible strategies and techniques for encouraging self-determined and prolonged participation in PA.

Need for the Study

The widespread failure to maintain a physically active lifestyle, and the current childhood obesity epidemic in Canada, suggests the need to further understand the complexities of PA motivations, in both the scholastic and applied domains, and necessitates new ways of studying and developing motivation for activity (Kilpatrick, Hebert & Jacobsen, 2002; Shields, 2005). Indeed children's sustained participation in PA outside of school hours remains problematic and further studies are warranted (Mandigo, Holt, Anderson, & Sheppard, 2008).

SDT has the ability to explain a wide variety of phenomena, based on very few principles (Chatzisarantis & Hagger, 2007). Research suggests that SDT can be used as a unifying approach for understanding and designing interventions in the motivational context to effect positive changes in the health and well-being of children (Frederick-Racascino, 2002). In fact, one of the most compelling reasons for studying motivation in PA is the desire to understand and link motivation with adherence, which can enable children to develop and maintain healthy PA behaviours (Annesi, 2006; Frederick-Racascino, 2002). The CKC program, an intervention designed to encourage PA and healthy behaviours, provides the opportunity to examine these relationships between motivation and PA participation. Furthermore, it is important to study these motivations

and evaluate this intervention in the after-school setting, as relatively few studies have been conducted (Kelder et al., 2005).

Delimitations

This study is delimited to children between the ages of 8-12 years old. The subjects in the treatment group were delimited to participants of the CKC program, and the subjects in the control group were delimited to those participants not from the CKC program.

Limitations

This study assessed a specific age population of children within a specific after-school childcare setting. This study also did not examine children with disabilities. Thirdly, this study likely did not examine the children most affected by obesity, as “obesity is pronounced for children from traditionally defined minority groups and those living in poverty” (Mahoney, Lord & Carryl, 2005, p. 202). Families that can afford to send their children to after-school childcare may not be at the greatest risk of obesity. Due to these factors, the results of this study may not be generalizable to other populations, or other after-school settings.

Due to the design of the study, the closed-ended questions of the survey items may have limited the possible responses of the subjects. Therefore, the open-ended responses requested at the end of the survey were also included in this study. The study was also

conducted at the situational level and was not able to assess the contextual or global motivational state of the participant.

During data collection, due to loss or failure to collect informed consent forms and financial concerns restricting return visits to one site per agency per time period, data collection was delayed at some sites, or conducted with a limited number of participants who had signed consent forms. This may have contributed to a smaller sample size (Sharpe, Forrester, Mandigo & Delion, 2009). Data collected for this study may also not be consistent, as delivery of the program may have not been standardized. Differences in instructor training, facilities, location, weather, and/or implementation issues may all have existed within the program delivery at each site (Sharpe et al.).

This study collected data from control sites that may have been exposed to the CKC program, or other healthy development programs. The knowledge and training each staff leader was equipped with may have varied at each site, which may have led to contamination of the control site data (Sharpe et al.). This study may also have baseline data that was elevated due to collection taking place in September 2008 after training had taken place during the summer (Sharpe et al.).

The participants of this study may not have received the same dosage of the CKC program. Some participants regularly attended and participated in the program every day of the week, while other participants attended the CKC program only once per week. In addition, the length of attendance may have varied, resulting in some participants who may not have received all of the components of the program. This could be because they

left the program early while other participants may have stayed in the program for the full time allowed and participated in all components of the CKC program (Sharpe et al.).

Assumptions

For this study it was assumed that based on the tenets of the SDT, children have a basic need for perceived competence, perceived autonomy and relatedness. It was also assumed that subjects were developmentally able to read, comprehend and complete the SASQ unassisted, and provided honest responses.

Research Question

The following research question will attempt to frame this study as it examines the motivational experiences of participants in the PA component of the CKC:

- (1) While controlling for gender and age, are there significant differences between the treatment (CKC program participants) and control (non-CKC) groups on their responses to each of the five measures of the SASQ after four (4) months of participation and after eight (8) months of participation?

Definition of Terms

CATCH – Originally named the Child & Adolescent Trial for Cardiovascular Health, this field study gathered data from 5106 students in 96 schools from the fall of 1991 to the spring of 1994. This acronym was since changed to the Coordinated Approach To Child Health, and represents a multi-component school-based intervention focused on

providing information and training to improve school food services, physical education class time, childhood healthy eating habits and non-smoking habits (Luepker et al., 1998).

CKC – The Catch Kids Club is a multi-component after-school based intervention designed on the principals of CATCH to improve PA levels, provide nutrition education and promote healthy snack options during program hours (Kelder et al., 2005).

Intrinsic Motivation – Characterised by engagement in an activity for the sake of the activity itself, rather than for external reasons. Experiencing interest, enjoyment, excitement and challenge are examples of intrinsic motivations (Deci & Ryan, 1985; Kilpatrick, Hebert & Jacobsen, 2002).

Moderate to Vigorous Physical Activity (MVPA) – Defined as any energy expenditure during PA that is equal to or greater than that required for walking (Kelder et al., 2003).

Optimal Challenge – The theoretical concept of flow is defined as a deep and fulfilling personal enjoyment associated with engaging in an activity to which an individual feels their skills or abilities match the challenge of a task (Csikszentmihalyi, 1990). Optimal challenge occurs when there is flow, or a harmony between the skill of the individual and the challenge of the task (Mandigo, Holt, Anderson & Sheppard, 2008). Optimal challenge is usually accompanied by feelings of intense concentration, loss of self-consciousness and loss of sense of time (Poulsen, Rodger & Ziviani, 2006).

Overweight/Obese – Children and adolescents who are at or above the 95th percentile of body mass index (BMI) for age and gender as determined by the 2000 Centers for Disease Control and Prevention (CDC) growth charts. (Boon & Clydesdale, 2005)

Perceived Autonomy – Characterized by an internal locus of control where volition of behaviours is consistent with a sense of self and there is a perception that behaviours are freely chosen (Deci & Ryan, 2000; Kilpatrick, Hebert & Jacobsen, 2002).

Perceived Competence – Experiencing a sense of mastery and the perception of being effective in one's interactions with the social environment, with the opportunity to exercise and express one's capacities (Kilpatrick, Hebert & Jacobsen, 2002; Ryan & Deci, 2002).

Physical Activity – Generally conceived as any bodily movement produced by skeletal muscle that results in energy expenditure (Biddle, 1995 as cited by Kilpatrick, Hebert & Jacobsen, 2002). This can include elective forms of activity such as sport and exercise and required forms such as labour (Kilpatrick, Hebert & Jacobsen, 2002).

Relatedness – A construct concerned with the psychological sense of being with others in secure communion or unity (Ryan & Deci, 2002). Relatedness is characterized by satisfaction and involvement with the social world (Kilpatrick, Hebert & Jacobsen, 2002).

Chapter 2

Guided by Deci and Ryan's Self-Determination Theory (1985), the intent of this study is to examine children's motivational experiences occurring during participation in the PA component of the CKC program. This analysis will provide one measure of the effectiveness of the CKC program, and assess its ability to foster self-determined motivations in children. To provide the appropriate background necessary for this study the following topics are discussed: (a) an overview of the Child and Adolescent Trial for Cardiovascular Health (CATCH), (b) the history of the CATCH Kids Club, (c) an outline of Self-Determination Theory and its connections with physical activity, and (d) a description of the Situational Affective State Questionnaire.

The Child and Adolescent Trial for Cardiovascular Health – An Overview

In the 1970's, school health education was provided much like other academic subjects, in hopes that students would practice healthier behaviour patterns due to greater knowledge and more positive attitudes towards personal and social health (Perry et al., 1990). In the 1980's, research began to appear confirming that school-based intervention programs were able to achieve behaviour changes in smoking rates, eating habits and PA patterns (Perry et al.). This led to a change in school-based health education, and marked a rapid increase in school-based intervention studies designed to improve child and youth health behaviour patterns (Perry et al.).

The Child and Adolescent Trial for Cardiovascular Health (CATCH) was a comprehensive intervention research study which began in the early 1990's, with aims to

continue the development and demonstration of the effectiveness of behavioural school health education (Perry et al., 1990). CATCH was designed in response to the need to develop programs that are implemented before health-related behaviour patterns are established. In order to do this, the CATCH program attempted to provide both a school-based and family-based intervention component (Luepker et al., 1998). In the school setting, the CATCH program was continuously implemented through school food service changes and physical education enhancement. A classroom curriculum was also provided once a year over a defined period of time and addressed eating habits, PA and cigarette smoking. As part of the family program, activity packets were sent home requiring students and an adult to work together to complete the activities. This home-based curriculum was intended to complement the classroom curricula. Finally, the family program also included fun nights that family members were invited to, such as dance performances and fairs with food booths, healthy recipes, and games (Luepker et al.).

The CATCH study was conducted at four study centers in San Diego, California; New Orleans, Louisiana; Minneapolis, Minnesota; and Houston, Texas (Webber et al., 1996). In total, 5 106 third grade students from 96 public elementary schools were recruited and followed for almost three years, from the fall of 1991 to the spring of 1994 (McKenzie et al., 1996). The 24 schools at each study site were then randomized into either the measurement only condition or the intervention condition of the study. Forty schools in total were assigned the measurement condition. Of the 56 schools assigned to the intervention condition, 28 received the school-based intervention and 28 received the

school-based plus family intervention (McKenzie et al.). At the end of the 2 ½ year period, follow-up data were collected from the baseline cohort, with a total of 4 019 children participating in the last data collection (Webber et al., 1996).

The CATCH study had three primary goals to be tested. The first goal was an environmental-level change, which aimed to reduce the total fat, saturated fat and sodium content of food served in school cafeterias. The study hoped to reduce total fat to 30% of the total calories served in a lunch meal, reduce saturated fat to 10% of total calories served, and reduce sodium content to 600-1000 mg/serving (Resnicow, Robinson & Frank, 1996). The second goal, also at the environmental-level of assessment, was to increase the amount of physical education class time spent engaging in moderate to vigorous physical activity (MVPA) to 40% (Resnicow, Robinson & Frank). The final goal was situated at the individual-level of change, and aimed to reduce the total cholesterol level in the blood to 5 mg/dl lower in intervention participants than in comparison students (Resnicow, Robinson & Frank). The study also planned to assess if CATCH could favourably modify psychosocial or mediating variables, self-reported diet and PA, and blood pressure (Resnicow, Robinson & Frank).

In order to accomplish these goals the CATCH intervention program included an Eat Smart program and a physical education component (CATCH PE). The Eat Smart program was implemented by providing a one-day training session at the beginning of each school year to the food service personnel and monthly follow-up visits and booster sessions (Luepker et al., 1998). The information and planning provided through the Eat

Smart program was in line with the United States Department of Agriculture guidelines for school meal menus and recipes (Hoelscher et al., 2001). The CATCH PE program provided one or one and a half days of training each school year to physical education specialists, on-site follow-up consultation every two weeks, and classroom curriculum intended to target specific psychosocial factors and skill development involved in eating behaviours and PA patterns (Luepker et al., 1998; McKenzie et al., 1996). Classroom curriculum consisted of lessons approximately 30 to 40 minutes in length and with a different focus each school year. Third grade students received 15 lessons of the Adventures of Hearty Heart and Friends over a five week period; fourth grade students received 24 lessons of the Go for Health-4: Taking Off curriculum for 12 weeks; and fifth grade students received 16 Go for Health-5: Health Trek lessons over an eight week period (Luepker et al., 1998; McKenzie et al., 1996).

At the end of the CATCH study, results showed successful conditions for some components of the intervention and no effect for others. In the school food service component of the study, percentage of fat calories and saturated fat calories decreased significantly in intervention sites, more than in comparison sites (Luepker et al., 1998; Resnicow, Robinson & Frank, 1996). The decrease did not reach the proposed goal of reduction to 30% of total fat and 10% of saturated fat in calories in food servings, however it was a substantial reduction in both and close to the target goals as total fat was reduced to 31.9% and saturated fat was reduced to 12% in intervention schools (Resnicow, Robinson & Frank). Unfortunately, the sodium levels increased in school

lunches for both conditions; however sodium did increase significantly less for intervention schools than comparison schools (Resnicow, Robinson & Frank).

At the individual-level, the CATCH study found that at follow-up the total blood cholesterol, blood pressure, pulse rate and body mass index (BMI) did not differ significantly between the conditions (Luepker et al., 1998; Resnicow, Robinson & Frank, 1996). The study did discover that dietary knowledge, intentions, and self-reported food choice changes were significantly greater for the intervention schools (Luepker et al.). The study also found that for those students participating in the school-based plus family intervention group they experienced even greater positive changes in dietary knowledge than those in the school-based intervention program (Luepker et al.).

Finally, when examining the data concerning CATCH PE, the results were very positive. A total of 2096 physical education lessons were observed and results showed that although the average length of physical education lessons did not change, the intensity of PA during class time increased significantly (Luepker et al., 1998; McKenzie et al., 1996). MVPA during physical education classes increased from 37% to 52% in intervention schools, bypassing the aim of increasing MVPA to 40% of class time by a substantial amount (McKenzie et al.; Resnicow, Robinson & Frank, 1996). Students in the intervention schools also reported a higher estimated energy expenditure and higher energy expenditure rate per lesson than children in comparison schools (McKenzie et al.). A final analysis showed that children in intervention schools reported engaging in

significantly more vigorous physical activity (VPA) minutes per day, both in and out of school, than children in comparison schools (McKenzie et al.).

Due to the success of the CATCH intervention program, CATCH: A Study of Institutionalization (CATCH-ON) (see figure 1) was conducted five years after the end of the main CATCH trial and aimed to determine the long-term viability and integration of the CATCH program (Hoelscher et al., 2004). The main objective of the CATCH-ON study aimed to examine the sustained achievement level of the original goals of the CATCH trial conducted from 1991 to 1994 (Hoelscher et al.). To evaluate the success of each of the CATCH components, the CATCH-ON study collected data from the 56 former intervention schools and 20 randomly selected schools from the 40 former comparison schools (Hoelscher et al.; Osganian, Parcel & Stone, 2003). It is important to note that each of the 40 schools that previously had no intervention exposure during the first CATCH study were provided with materials and a one day in-service training after the study, which was necessary to implement all the CATCH components of the program in those schools. To provide a comparison to these 76 CATCH exposed schools for the CATCH-ON study a control group was created of 12 new schools with no exposure to CATCH during the previous five years (Hoelscher et al., 2004).

Five years after the end of the CATCH study, the CATCH-ON study aimed to assess five main objectives. Three objectives were formed around the main goals of the CATCH study: (1) to determine if school food services maintained the recommended levels of essential nutrients while reducing total and saturated fat content of school

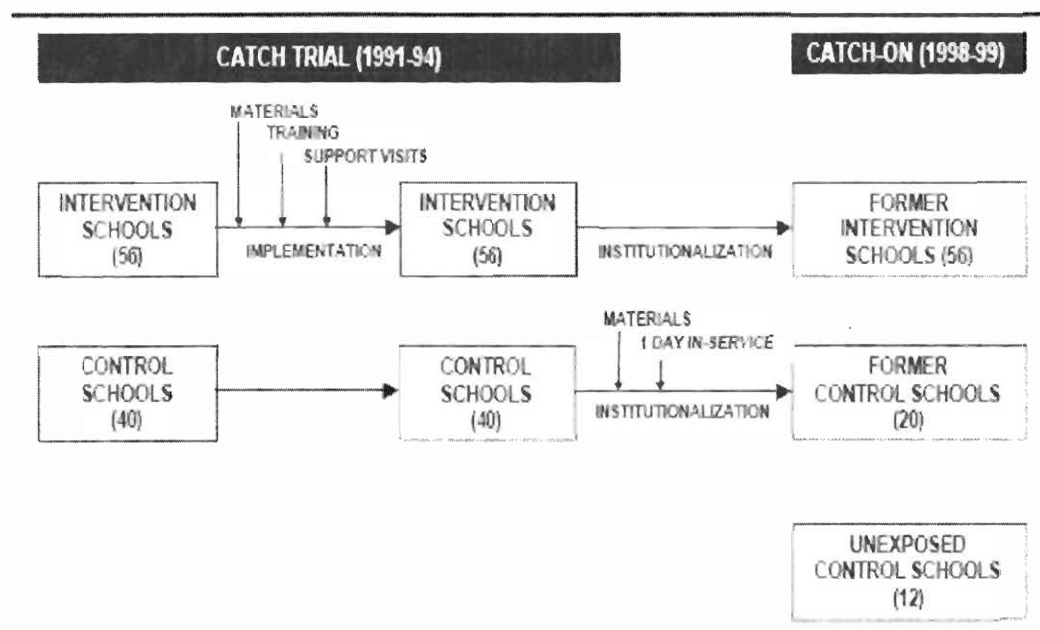


Figure 1. Overview of the CATCH-ON Study Design (Osganian, Parcel & Stone, 2003)

lunches by 30% and 10% respectively, (2) to determine if students were engaged in MVPA for at least 40% of the class period and if physical education classes continued to be offered for 90 minutes per week, and (3) to determine if the CATCH curriculum implemented in each grade level was provided to students to acceptable levels of completeness (Osganian, Parcel & Stone, 2003). This study also designed two new objectives as CATCH-ON aimed to examine if the differences in school climate, teacher and staff characteristics, school turbulence, and school facilities and resources explained the variations in levels of institutionalization of the CATCH program; and to assess if maximum exposure to the CATCH program (former intervention schools) resulted in higher levels of institutionalization than minimal exposure to the CATCH program (comparison schools provided with training after the CATCH study concluded in 1994) (Osganian, Parcel & Stone).

To meet these goals, the CATCH-ON study gathered data during the 1998-1999 school year, using new measures and some measures conducted in the CATCH trials (Osganian, Parcel & Stone, 2003). When analyzing the difference of sustained effects of each CATCH component individually for former intervention and comparison schools, and also the differences between the CATCH exposed schools and control schools, this study found mixed results. The Eat Smart program showed differences between former intervention and former comparison schools, as 50% of former intervention schools reduced total fat content of school lunches by 30% compared to only 10% of former comparison schools. When examining saturated fat content, 45% of former intervention schools and only 30% of former comparison schools reduced saturated fat content of

school lunches by 10%, the desired amount (Hoelscher et al.). However, when examining nutrient content of school lunches this study found no significant differences between CATCH exposed schools and control schools (Hoelscher et al.). For the CATCH PE component, no significant differences between former intervention, former comparison and control schools were seen for the percent of class time spent in MVPA (Hoelscher et al.). When examining the adherence of the schools to the CATCH curriculum, the study found that the number of classroom lessons taught was low in both CATCH exposed school types, but significantly more time was spent teaching CATCH lessons in former intervention schools than compared to former comparison schools (Hoelscher et al.).

To analyze institutionalization, a composite index was used including the effectiveness of all of the components of the CATCH intervention. This formula combined two measures from the CATCH PE component, two measures from the Eat Smart program and one measure from the curriculum delivery, and is defined as “%VPA + %MVPA - %Fat - %SatFat + 2 x Curric” (Hoelscher et al., 2004, p. 598). Overall, the CATCH-ON study found that the mean CATCH Institutionalization scores were significantly higher for former intervention schools than for former comparison schools, validating that maximum CATCH exposure resulted in overall better results in terms of institutionalization (Hoelscher et al.). When comparing the institutionalization scores for CATCH exposed schools to control schools similar results were shown (Hoelscher et al.). The study also found that the training of school personnel was essential to sustaining program implementation and intervention effects (Hoelscher et al.).

At the conclusion of the CATCH-ON study, researchers found that in the school setting “aspects of the CATCH program were found to be maintained five years post-intervention” (Hoelscher et al., p. 604). The next step for researchers and practitioners was to explore other environments and examine the possibility of the implementation of the CATCH program with children outside of the school setting.

The After-School Setting

As stated earlier in this review, children spend a large portion of their time in the school setting (Boon & Clydesdale, 2005). It is also true that the school setting has become a focal point for interventions designed to increase PA levels of children (Beets, Beighle, Erwin & Huberty, 2009). Although there are many advantages to attempting to increase the PA levels of children in the school setting, one large limitation to this setting is the time constraints inherent in a 9:00 am to 3:00 pm schedule (Beets et al.). With schools being expected to continually improve their students’ academic achievements, time for PA during recess, PE classes, at lunch and in the classroom may be on the decline. In fact, research has shown that even the best PE classes may not provide the recommended amount of PA (Sallis & McKenzie, 1991).

During the after-school setting, children are not always achieving the required amount of PA either. From the completion of school to the family’s evening meal, many children commonly engage in overeating and sedentary behaviours such as TV watching and playing video games (Battista, Nigg, Chang, Yamashita & Chung, 2005; Crawford et al., 2001; Dietz & Gortmaker, 2001). A study conducted by Dale, Corbin and Dale

(2000) found that after a school day that is not physically active, 78 children aged 8-10 years did not compensate by increasing PA levels during the afternoon or evening. They were not able to self-regulate their behaviour and maintain their PA participation levels. These findings demonstrate the need for PA interventions in the after-school setting. Providing more focus on this setting has great potential, as the number of after-school programs for children has increased tremendously in the last 10 years (Witt, 2004). Research has shown that the after-school setting provides an opportunity to promote lifelong PA for children (Bocarro, Kanters, Casper & Forrester, 2008), a setting where PA interventions can be introduced and studied.

Many studies have illustrated the improvements PA interventions can effect in the after-school setting, beyond increasing the PA levels of children. Keeping children engaged in PA during after-school hours also has the potential to decrease delinquency, risky health behaviours and social problems, all of which are most likely to occur during after-school hours (McKenzie, Marshall, Sallis & Conway, 2000). In addition, studies have shown that participation in extracurricular activities has been linked in research to increases in academic performance, self-esteem, self-confidence, and intentions to maintain healthy behaviours (Durlak & Weissberg, 2007; Lauer et al., 2006; Story et al., 2003). All of these benefits can occur in the after-school environment while youth are feeling more challenged and finding more enjoyment than in the classroom (Hansen, Larson, & Dworkin, 2003; Larson, 2000; Larson & Kleiber, 1993). All of these studies demonstrate the importance of interventions such as the CATCH Kids Club in the after-school setting

The CATCH Kids Club

A new adaptation of the CATCH program has been recently developed for the after-school environment in the United States. The CATCH Kids Club (CKC) is designed on the same components of the CATCH intervention and includes an education, PA and snack component (Kelder et al., 2005). The five-module education component provides children with activities designed to improve knowledge of a particular concept concerning nutrition every school day for three weeks (Kelder et al.). Nutrition activities are divided into two developmentally appropriate groupings for children from kindergarten to grade two, and children from grades three to five (Kelder et al.). Healthy snack menus are provided in the educational manual as well. To implement the PA component, after-school program staff received a four hour training session consisting of methods that maximise the number of students involved in an activity and to increase the amount of MVPA of an activity (Kelder et al.). Staff also received an activity box that provides hundreds of cue cards describing fun, active and inclusive games for children from grades kindergarten to five (Kelder et al.).

To assess the effectiveness of the CKC intervention program, 157 students were measured in 16 after-school programs in El Paso and Austin, Texas (Kelder et al., 2005). In El Paso, 69 children received all three CKC components. However due to logistics and economic concerns, the 88 children in Austin only received the PA component of the program (Kelder et al.). Over a five month period, the study gathered baseline and follow-up data from the participants including self-reported measures, direct observation

and focus group interviews. At pre and post-test collection times, the participants provided a description of their food intake and PA by completing a questionnaire, and the researchers collected direct observations of children's PA during free play time using the System for Observing Fitness Instruction Time (SOFIT) measurement tool (Kelder et al.). During the post-test time frame, 12 focus group interviews were conducted with program staff, who commented on the efficacy of the program, their intentions to continue using the program and their perceptions of the students' learning and enjoyment (Kelder et al.).

At the conclusion of the study, some important and significant results were found. Food knowledge increased for students in the intervention measure as compared to the control group (Kelder et al., 2005). It was also revealed in the focus groups that program staff believed that the snack component of the program was a success, as students were able to "gain 'hands-on' experience with snacks [which] encouraged children to start a dialogue with their parents regarding healthy food choices" (Kelder et al., p. 138). The focus groups also revealed the belief that the PA and education component of the program was easy to implement and was enjoyed by both teachers and students (Kelder et al.)

Most importantly however, the results showed that MVPA almost doubled for children in intervention sites (from 30% to 57%), while MVPA decreased from 48% of the time to 31% of the time at control sites (Kelder et al.). The study also found large reductions in the time spent standing and sitting during PA, and unstructured free time was reduced by 64 minutes, which coincided with an increase in game play time by 30

minutes (Kelder et al.). Finally, the results demonstrated that the other variables in the study were not statistically significant, however they were all in the desired direction (Kelder et al.). Thus, the results from this study “offer guarded enthusiasm for the after-school intervention approach and warrant further investigation, building on the results and feedback obtained from this pilot study” (Kelder et al., p. 139).

In order to build on the results of this pilot study, it is important to understand in detail the measurement tool used in this study - named SOFIT. The assessment of SOFIT’s effectiveness as a measure enables future researchers to replace or supplement this tool with other measures to gain a more complete and comprehensive understanding of the CKC’s success as a healthy behaviours intervention.

The Established Research Methods of the CATCH and CKC Studies

Throughout the CATCH study, CATCH-ON study and CATCH Kids Club pilot study, the System for Observing Fitness Instruction Time (SOFIT) has been used as a consistent measure of PA levels (Luepker et al., 1998; Hoelscher et al., 2004; Kelder et al., 2005). SOFIT “involves the systematic observation of physical education classes while simultaneously recording student PA levels, curriculum context variables, and teacher behaviour” (McKenzie, Sallis & Nader, 1991, p. 195). SOFIT was used due to the advantages of direct observational measurement tools, as SOFIT has the ability to record contextual variables, compare results to measures of energy expenditure, and consider such measures as instructional factors of teacher behaviour and curriculum context (McKenzie, Sallis & Nader).

Using the SOFIT measurement tool, observers randomly selected four children from the group within the PA space and observed one child at a time, coding activity levels at 20 second intervals for four minutes. If engagement level of the subject is equal or less than that of ordinary walking, they receive a code of 1 to 4 outlining their body position (lying down, sitting, standing and walking) (McKenzie, Sallis & Nader, 1991). If the subject is expending more energy than is required during ordinary walking, they receive a code of '5' representing 'very active' engagement (McKenzie, Sallis & Nader).

At each interval, a second observation is recorded and paired with the PA engagement level of the subject child. Observers choose from seven lesson contexts and code them the instant the observation interval ends (McKenzie, Sallis & Nader, 1991). Observers decide whether the lesson content is being allocated for general content, lesson content or behaviour management content. The observers then make a further decision breaking down lesson content into knowledge content or motor content. Finally, if motor content is being observed, the context can be coded as one of fitness, skill practice, game play or other (McKenzie, Sallis & Nader).

Intended to quantify factors believed to promote health-related PA (McKenzie, Sallis & Nader, 1991), the analysis of the SOFIT data can provide many possible process measures after direct observation of subjects is recorded. SOFIT is able to provide the proportion of lesson time the subjects were very active (VPA), and the time the subjects were walking or very active (MVPA); estimated class energy expenditure (CEE: kcal/kg/min); and finally the proportion of lesson time allocated to the seven lesson

contexts (McKenzie et al., 2003). However, SOFIT does have its limitations. SOFIT provides an objective measure of PA levels at specific time intervals (Lytle et al., 1994), and does not measure the impact of the PA component of the program beyond the lesson time. Also, this measurement tool cannot report on the possibility of adherence to PA participation outside of the lesson time, and into the future.

As stated above, SOFIT is a process measure that evaluates the effectiveness of the intervention being carried out. However statements about the outcomes of an intervention must also be made (McKenzie, Sallis & Nader, 1991). In order to provide a richer understanding of the effect of these interventions, examining children's level of motivation after PA is also needed (Mandigo, Holt, Anderson & Sheppard, 2008). It is important for the children participating in the CKC program to continue engaging in the healthy behaviours they develop during the intervention. Research has shown a strong connection between self-determined motivation and the intent to persist or adhere to behaviours (Chatzisarantis & Hagger, 2007; Deci & Ryan, 1985). In fact, research has specifically shown that increasing a child's intrinsic motivation is able to improve children's engagement in PA (Kilpatrick, Hebert & Jacobsen, 2002; Poulsen, Rodger & Ziviani, 2006; Ryan & Deci, 2000a). Studies of after-school intervention programs based on intrinsic motivation research and the framework of Self-Determination Theory therefore will be able to identify children's self-determined behaviours during the intervention which research has shown can lead to continued engagement in behaviours, a significant outcome to assess.

Self-Determination Theory – An Overview

Self-Determination Theory (SDT: Ryan & Deci, 2000b) is an approach to understanding human motivation and personality. SDT is built on the assumption that humans are growth-oriented organisms and as they develop “have an inherent tendency toward integrating experiences into a unified regulatory process” (Deci & Ryan, 2002, p.433). This idea that there is a fundamental human nature to integrate and develop, is contrasted with the belief that certain social environmental conditions can both foster and thwart human development and result in a fragmented and reactive self (Ryan & Deci, 2002). SDT is based on this Organismic-Dialectic metatheory (Deci & Ryan).

Basic Needs Theory.

SDT is itself made up of four sub-theories: Basic Needs Theory, Cognitive Evaluation Theory, Organismic Integration Theory and Causality Orientation Theory. Basic Needs Theory (BNT: Ryan & Deci, 2000c) posits that across all domains and developmental periods there are three basic psychological needs, the need for autonomy, competence and relatedness, that are necessary for integrity, growth and well-being, and when thwarted foster ill-being and a variety of non-optimal outcomes. Ryan and Deci define a need as an essential and universal nutrient that must be acquired to maintain a living entity’s growth, integrity and physiological or psychological health. Ryan and Deci also stress in their theory that needs are not to be confused with goals, desires or other motivational forces directing human behaviour and development.

When describing these three psychological needs, Ryan and Deci (2000b) characterize competence as a sense of mastery and self-efficacy; autonomy as a construct characterized by the perception that behaviours are freely chosen; and relatedness is characterized as an interaction between, and also satisfaction with, the social world. The generality of these three needs has been critiqued by other researchers since their introduction. However Ryan and Deci (2000c) state that “we believe that their utility comes largely from the fact that they do apply so generally and so aptly across multiple domains of human experience” (p. 324). In fact, Ryan and Deci state that earlier need-related theories fell out of favour in the academic community when the list of human needs continued to grow, and became too long and unmanageable. They state that by staying true to their definition of a need as something that promotes well-being when fulfilled, they have been able to maintain a list of only three needs, and are able to address the common satisfying elements in the conditions that contribute to the satisfaction of these needs.

The Self-Determination Continuum.

Deci and Ryan (2002) claim that “all humans, regardless of culture or gender, need to feel both related and autonomous in order to be healthy” (p.435). Numerous studies have also shown that along with autonomy and relatedness, competence is a third need necessary to the facilitation of healthy behavioural, cognitive and psychological outcomes (Gillison, Standage & Skevington, 2006).

Intrinsic motivation is created through the facilitation of these three psychological needs (Deci & Ryan, 1985). Intrinsic motivation is regarded as engaging in an activity for the sake of the activity itself (Ryan & Deci, 2000b). For example, a person may read a book for simply the enjoyment of the activity itself. Excitement, interest, inherent satisfaction, mastery, stimulation and challenge are also examples of reasons for participating in intrinsically regulated behaviours (Kilpatrick, Hebert & Jacobsen, 2002).

Vallerand (2000) states that the intrinsic motivations to know, to accomplish, and to experience stimulation are the most self-determined motives (see Vallerand et al., 1992; Vallerand et al., 1993 for more detail). Along with intrinsic motivation, there are two other general types of motivations that Deci and Ryan organize along a continuum of self-determination (2002). Looking at Figure 2, moving from right to left along the continuum, after intrinsic motivation, extrinsic motivation is introduced as a less self-determined form of motivation. Extrinsic motivation is engaging in behaviours to satisfy extrinsic motives (Ryan & Deci, 2000b). These motives can include rewards, punishments, fear, guilt and obligations (Deci & Ryan, 2002). These extrinsic motives are further broken down by Deci and Ryan into four motivations that are more specific: integrated regulation, identified regulation, introjected regulation and external regulation.

Integrated regulation occurs when the individual's beliefs and values are in harmony with the behaviour demonstrated (Vallerand & Bissonnette, 1992). Identified regulation occurs when behaviour is performed as a means to an end, but is freely chosen by the individual (Vallerand & Bissonnette). This is the last motivational type that is

The Self-Determination Continuum Showing Types of Motivation With Their Regulatory Styles, Loci of Causality, and Corresponding Processes

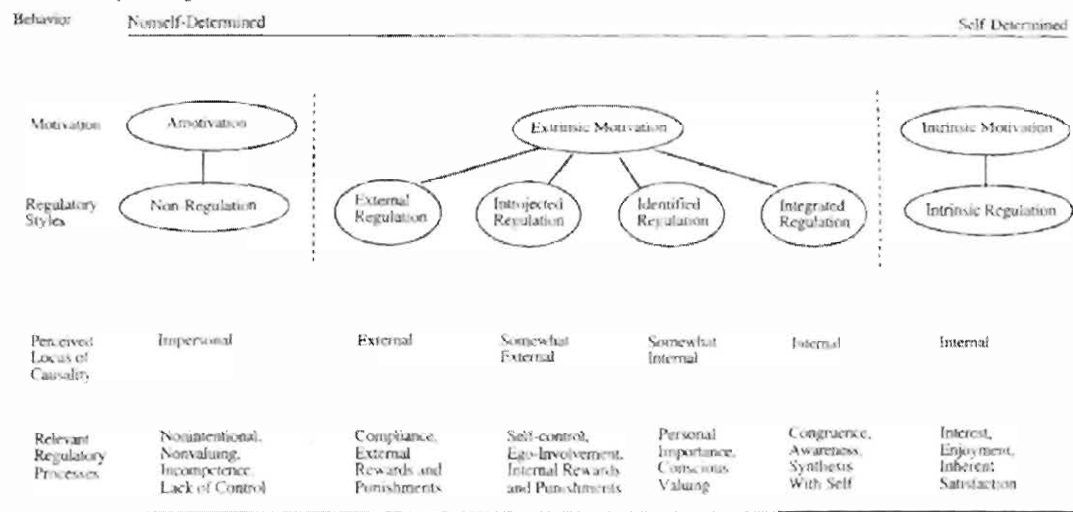


Figure 2. The Self-Determination Continuum (Deci & Ryan, 2002)

self-determined. Introjected regulation is when the individual internally controls the rewards or constraints that motivated him or her (Vallerand & Bissonnette; Ryan, 1982). External regulation occurs when behaviour is externally regulated through consequences, constraints or rewards (Vallerand & Bissonnette). Finally, at the far left of the continuum and the polar opposite of motivation is amotivation. Amotivation refers to a lack of intensity and intention to act (Ryan & Deci, 2000b; Deci & Ryan, 2002; Kilpatrick et al., 2002).

Cognitive Evaluation Theory.

Cognitive Evaluation Theory (CET: Ryan & Deci, 2000b) posits that as each unique social environment presents different challenges to humans, we continually assimilate and adapt to these social environments. The first research conducted in the area of SDT concerned this interaction between the social environment and its ability to support or thwart competence, autonomy and relatedness (Deci, 1971). As discussed previously, the support of these three innate needs leads to intrinsic motivation (Deci & Ryan, 1985). Thus, CET looks at the ability of the social environment to facilitate or thwart intrinsic motivation and intrinsically regulated behaviours.

Within CET is the concept of a perceived locus of causality. An internally perceived locus of causality includes behaviours that are experienced as part of the self, and not undertaken for external reasons (Ryan & Deci, 2000a). Specifically, CET states that the facilitation of competence and autonomy in any social environment are required for an internally perceived locus of causality and intrinsic motivation (Ryan & Deci,

2000b). Conversely, an environment that promotes an externally perceived locus of causality will diminish intrinsic motivation (Ryan & Deci).

Early research on intrinsic motivation found that extrinsic rewards have the ability to undermine intrinsic motivation (Deci, 1971). Since that time, numerous studies have further developed an understanding of the factors that enhance or diminish intrinsic motivation (Deci & Ryan, 2002). A meta-analysis by Deci, Koestner, & Ryan (1999) presented more than 125 articles that examined the effects of rewards, threats, deadlines, directives, imposed goals, pressure evaluations, competition, and interpersonal climates on intrinsic motivation.

The explanation of CET in this review however has not included the third innate psychological need, that of relatedness. Within the framework of SDT, it is assumed that a basic psychological need such as relatedness is necessary for the growth and well-being of humans (Ryan & Deci, 2002). However when discussing CET and intrinsic motivation, it is important to note that some activities can create intrinsic motivation in isolation (Ryan & Deci, 2000b). Ryan and Deci (2000b) propose that relatedness is a basic need that is not always necessary but an important determinant of intrinsic motivation. Vallerand (2000) states that the need for relatedness may play a more remote function in certain types of activities, however it can also play a very important function in activities and tasks that are inherently social in nature. Ryan and Deci describe the role of relatedness in fostering intrinsic motivation as a constant, but sometimes distal role (2000b). Relatedness may however play a key role in the value transmission process

that is involved in internalization (Vallerand, 2000) – an element of the Organismic Integration Theory (OIT: Ryan & Deci, 2000b) proposed by SDT.

Organismic Integration Theory.

In 1985, SDT research began to be conducted concerning the differentiation between intrinsic and extrinsic motivation (Ryan, Connell & Deci, as cited by Deci & Ryan, 2002). Another sub-theory of SDT, Organismic Integration theory (OIT) describes the degree of internalization accompanying extrinsically motivated behaviours, “SDT emphasizes that people become more autonomous with respect to behaviours or domains as the Organismic integration process leads the behaviours to become more integrated within one’s unified sense of self” (Deci & Ryan, 2002, p.436).

Since that time many studies have examined the conditions that promote more versus less self-determined forms of extrinsic motivation and have related these conditions/extrinsic motivations to important outcomes like persistence, learning, pro-social activity, healthy behaving, and psychological well-being. (Deci & Ryan, 2002). It is important to note that well-internalized extrinsic motives can be as useful for behavioural regulation as intrinsic motives when the target behaviour may not be inherently self-rewarding (Ryan, 1995).

Causality Orientation Theory.

Deci and Ryan (1985; 2002; 2008) defined Causality Orientation Theory (COT) as a sub theory that describes how the individual differences in personality affect the way

people orient themselves to an environment and to initiation and regulation of behaviour in specific environments. They state that the orientation of an individual – their perceived locus of causality – will determine whether their general tendencies across different situations and life domains will be more autonomous or controlled (Deci & Ryan, 1985).

The first research into this area was conducted by deCharms (1968) who stated that the initiating action of personally caused actions can be perceived as either internal or external. If an individual has an internally perceived locus of causality their desires or interests will be the initiating action (deCharms). An externally perceived locus of causality will occur if an external event is experienced as the initiating action (deCharms).

Deci and Ryan (2008) state that COT is tightly connected with the three innate psychological needs of SDT. They state that there are three different orientations linked with these needs (Deci & Ryan). An autonomous orientation exists when there is an ongoing satisfaction of the three needs of autonomy, competence and relatedness (Deci & Ryan). A controlled orientation results from partial satisfaction of the competence and relatedness needs and concurrently a thwarting of the need for autonomy (Deci & Ryan). The third orientation results from a general lack of satisfaction of all three needs. This is named an impersonal orientation (Deci & Ryan). Research has shown that autonomous orientations can lead to positive psychological health and effective behavioural outcomes,

while controlled and impersonal orientations can lead to diminished or poor functioning and well-being (Deci & Ryan).

Using SDT as a framework to assess the success of the CKC program can provide more complex and outcome based findings. Ryan and Deci (2000) stated that “research on the conditions that foster versus undermine positive human potentials has both theoretical import and practical significance because it can contribute not only to formal knowledge of the causes of human behaviour but also to the design of social environments that optimize people’s development, performance, and well-being” (p. 68).

The Situational Affective State Questionnaire

Intrinsically motivated behaviour is considered the most desirable of all motivations due to its positive associations with adherence and persistence (Kilpatrick, Hebert & Jacobsen, 2002). Kilpatrick, Hebert and Jacobsen stated that “this is because participation is based on appreciation of the activity itself, rather than appreciation for some benefit provided by the activity” (p.37).

Within the framework of the SDT, many studies have been published examining intrinsic motivation and healthy PA behaviour intervention programs. The Situational Affective State Questionnaire (SASQ) is one measure used to assess various elements of the SDT framework (Mandigo et al., 2008). The SASQ assesses the level of a subject’s self-determination using five subscales. Based upon the SDT, the 22 items of the SASQ assess the subject’s optimal challenge, intrinsic motivation, perceived competence,

perceived autonomy and relatedness on seven-point Likert scales ranging from “no way” to “for sure” (Mandigo et al.).

In SDT research, optimal challenge has been linked to PA participation in many studies (Csikszentmihalyi, 1990, 1975). In a review of SDT literature by Frederick-Racascino (2002), the sport and exercise domain is shown to be positively related to intrinsic motivation, which in turn leads to a level of optimal challenge that can fulfill all three basic needs outlined in the SDT. Independently, intrinsic motivation also has strong connections within the PA domain, as it can lead to positive consequences and persistence in an activity (Weinberg & Ragan, 1979; Ntoumanis, 2001). In fact, recent studies have also shown that intrinsic motivation will lead to increased PA participation, commitment and quality of life (Gillson, Standage & Skevington, 2006; Papaioannou et al., 2006; Zahariadis, Tsorbatzoudis, & Alexandris, 2006).

When reviewing the PA literature regarding the competence, autonomy and relatedness needs measured in the SASQ, strong relationships have consistently been found. Similar to the other needs, studies have shown a strong positive relationship with PA participation and the competence need of a PA participant (Papaioannou et al., 2006). Likewise, autonomy support has been found to promote PA intentions and behaviours (Hagger, Chatzisarantis, Culverhouse & Biddle, 2003; Pelletier, Fortier, Vallerand & Briere, 2001; Sarrazin, Vallerand, Guillet, Pelletier & Cury, 2002). Although the majority of empirical research has been on the competence and autonomy needs (Frederick-Racascino, 2002), studies have also found that relatedness motives can have a

significant influence on sport and PA participation (Buonamano, Cei, & Mussino, 1995; Weinberg & Gould, 1999).

One of the five constructs of the SASQ, the optimal challenge subscale consists of six items from the skill = challenge subscale of the Children's Perception of Optimal Challenge Inventory (Mandigo & Sheppard, 2003). Optimal challenge can be characterized as an elevated state of intrinsic motivation (Frederick-Recascino, 2002), which occurs when there is flow (Csikszentmihalyi, 1990), or a matching of the skill of the individual to the challenge of the task (Mandigo et al., 2008). "Experiencing 'flow,' or being in 'the zone,' widely discussed in athletic experience (Csikszentmihalyi, 1990, 1975) is understood in self-determination theory as representing the heightened awareness and feelings of well-being associated with intrinsic motivation" (Frederick-Recascino, 2002, p. 279).

The four items of the intrinsic motivation subscale were taken from McCauley, Duncan and Tammen's (1989) revised Intrinsic Motivation Inventory (IMI). Intrinsic motivation is associated with feelings of satisfaction, enjoyment, competence and persistence (Frederick-Recascino, 2002). This subscale assesses these feelings and provides a measure of the intrinsic motivation of the participant. The perceived competence subscale (four items) also comes from McCauley et al.'s (1989) revised Intrinsic Motivation Inventory (IMI), and assesses how competent the participant feels during the activity.

The perceived autonomy subscale includes six items from Hagger et al. (2003) which assesses the degree to which participants perceive their behaviours to be freely chosen (Mandigo et al., 2008). Research has shown that participants who experience choice-fullness in their behaviour fulfill their need for autonomy (Frederick-Recascino, 2002).

The final subscale consists of two items developed by Ntoumanis (2001) to measure how related participants felt to others in the program (Mandigo et al., 2008). Those experiencing relatedness often experience feelings of satisfaction and involvement with the social world (Kilpatrick, Hebert & Jacobsen, 2002).

The Importance of Competence, Autonomy and Relatedness – An Integrated Motivational Sequence

Within a PA context, reviewing the importance of the three basic psychological needs measured by the SASQ leads to a required understanding of the integrated motivational sequence as proposed by Vallerand and Losier (1999). Many studies have advocated that the strength of the three basic needs of competence, autonomy and relatedness lie in their ability to mediate and predict self-determined motivations. This sequence, based on the tenets of the SDT, proposes that social or environmental factors such as feedback from a coach, success vs failure, and competition vs cooperation can influence perceptions of competence, autonomy and relatedness (Vallerand & Ratelle, 2002). These perceptions determine which types of motivations are exhibited, and finally lead to cognitive, behavioural and affective outcomes (Vallerand & Losier). Research has

shown that in a PA setting, participants benefit if they experience need satisfaction, which leads to self-determined motivations and behaviours such as persistence, effort, well-being and adherence (Ferrer-Caja & Weiss, 2000; Hagger, Chatzisarantis & Harris, 2006; Ntoumanis, 2001; Vallerand & Losier).

In a study by Annesi (2006) examining 84 children between the ages of 9 and 12, participants in a youth fitness program who demonstrated increased self-efficacy and competence were significantly more likely to participate in voluntary PA. Similar results were found by Ferrer-Caja and Weiss (2000) in a study examining 407 high school students. The study demonstrated that perceived competence directly predicted intrinsic motivation in participants, which directly predicted effort and persistence. In a study of 882 Greek students, again competence and intrinsic motivation at the beginning of the year positively predicted PA participation at 7 and 14 months later (Papaioannou et al., 2006).

Pelletier et al. (2001) found that autonomy supportive coaching styles positively predicted self-determined motivations as well. The study showed that at 10 and 22 months later, the persistent swimmers had experienced self-determined motivations at baseline, and the drop-out swimmers had not. Hagger and colleagues (2003) studied 295 students assessing their perceived autonomy, intentions and behaviours in a PE context and a leisure-time context. They found that perceived autonomy directly influenced the motivations of the students, resulting in self-determined motives, which lead to the intent to engage in PA during their leisure time. Further, this study actually found that

perceived autonomy had a small but direct impact on the actual leisure-time behaviours of the students. (Hagger et al.).

The Effect of Gender and Age on Competence, Autonomy and Relatedness

A study by Sarrazin et al. (2002) reported that for 335 French female adolescents engaging in handball, the persistent players experienced greater need satisfaction, reported higher levels of intrinsic motivation and reported lower intentions to drop out. However, results from studies like this one may not be generalizable to the entire male and female adolescent population as research has indicated that motivational differences exist between genders (Frederick, Morrison & Manning, 1996; Frederick & Ryan, 1993). Although Ryan and Deci (2000b) argue that the motivational processes essential for human functioning are equal across genders, researchers have also found that social environmental influences which support need satisfaction can contribute to greater prominence of specific motives for each gender (Frederick-Racascino, 2002; Ryan & Deci). Frederick and Ryan (1993) stated that within the literature, findings demonstrate that males are expected to rate competence motives more highly than women, replicating prior studies (Biddle & Bailey, 1985; Mathes & Battista, 1985 as cited by Frederick & Ryan).

Gillison and colleagues conducted a study of 18 children with a mean age of 14. They found that introjected external motivation accompanied high levels of self-determined motivation and was associated with high levels of PA (Gillison, Osborn,

Standage, & Skevington, 2009). They also found significant effects when controlling for gender and warned that:

Ignoring differences between gender groups, and the diverse barriers to exercise participation faced by each, would be likely to lead to interventions which may support only one gender in increasing or maintaining their exercise levels, while being of very little assistance, or potentially counter-productive for the other. Such effort could be partial, wasteful of resources and ethically questionable (p.317).

A study conducted by Daley and O’Gara (1998) examined 145 children 8-19 years of age. It found that gender had significant effects on the participants’ motivation to engage in extra-curricular PA. The study also found that age had a significant effect on motivation, a result mirrored by Gould, Feltz and Weiss (1985). They found that children aged 8-11 years old were more motivated by extrinsic factors, and the groupings of children aged 12-14 and 15-19 demonstrated more intrinsic motivation. These findings are in line with SDT as Ryan and Deci (2000b) suggest that the factors leading to need satisfaction may not be consistent across the lifespan. These findings suggest the need to measure gender and age in studies of PA and motivation to ensure their effects are controlled.

Starting with an overview of CATCH, CKC, and SDT, this chapter has aimed to provide the necessary background knowledge for this study. This information demonstrates both the need for, and direction of this study. Based on the tenets of SDT

and using the SASQ, this study statistically analyzes the competence, autonomy, relatedness, intrinsic motivation and optimal challenge of participants in the CKC program and compares them to the same SDT constructs of children not exposed to the CKC program. As explained previously, SDT has the ability to explain a wide variety of phenomena, and in particular, demonstrate the likelihood of persistence or maintenance of behaviour (Deci & Ryan, 1985). Although the data collected for this study limits the ability to calculate a definitive number for the probability of persistence, this study is able to connect the motivational experiences of participants with the likelihood of persistence in that behaviour, based on the links provided in previous research (Deci & Ryan, 2008; Gillson, Standage & Skevington, 2006; Kilpatrick, Hebert & Jacobsen, 2002; Ntoumanis, 2001). The SASQ is able to examine the CKC participants' motives, and assess if they are the same motives that have been identified elsewhere to lead to enjoyment and adherence of healthy PA behaviours.

Chapter 3

The present study is part of a larger research project with the overall goal of examining changes in children's healthy behaviours as a result of participation in the CKC program. Grounded in Self-Determination Theory (Deci & Ryan, 1985), this study investigated children's motivational experiences arising from participation in the PA component of the CKC program in an effort to assess if the CKC program is an effective intervention for increasing healthy behaviours. The focus of this research was to assess the degree of optimal challenge, intrinsic motivation, perceived competence, perceived autonomy and relatedness experienced by the participants immediately after participation in the PA component. This information provided a more complete understanding of what children's affective reactions were to the PA component of the CKC program and provided possible strategies to encourage further development of self-determined motivation in the PA component of the program. The following topics are discussed to provide an overview of the methods used in this study: (a) design of the study, (b) arrangements for conducting the study including research ethics, (c) instrumentation, (d) procedures for testing and gathering data, and, (e) treatment of the data.

Design of the Study

The purpose of this study is to examine the affective reactions of PA participants in the CKC program, using the tenets of Self-Determination Theory to guide the examination. The data used for this study is secondary data, which was collected at childcare centers from September 2008 to June 2009. Approximately 330 after-school settings across Ontario

implemented the CKC program (Sharpe et al., 2009). YMCA and Boys & Girls Club (BGC) administrators selected and recommended the control and experimental sites where data was collected for this study. The study sample was selected in an attempt to proportionally represent the geographic location (ex. districts/regions, urban/rural, etc.), socioeconomic status, time of implementation, program facility (ex. school-based or recreation centre), and type of CKC program (ex. new or converted) that is present within the 330 after-school programs (Sharpe et al.).

The design of the data collection was a quasi-experimental pre-test post-test design with control and experimental groups. It was not practical to conduct a true experimental study of the implementation of the CKC program and so nonrandomized experimental and control groups were created for this study (Leedy & Ormrod, 2005). Originally, of the 52 sites selected for the study sample, 34 sites were CKC exposed sites and the remaining 18 sites were control sites (Sharpe et al., 2009). After completion of the collection of data however, three sites were removed from the study due to complications with the consent form process, site location or inability to implement the CKC program at that site (Sharpe et al.). At the conclusion of the study, data was successfully collected from 31 CKC exposed sites, which represented the experimental group and 18 sites, which represented the control group.

Arrangements for Conducting the Study Including Research Ethics

The CKC program was implemented across Ontario to the YMCA and BGC sites progressively. Some sites received the necessary resources to begin implementation of the program at the start of the year in September. Other sites were phased into implementation

slowly throughout the year, due to logistics and at the discretion of the YMCA and BGC administrators. The experimental sites where data was collected for this study were first selected by the key administrators of YMCA Ontario. The program leaders were then informed of the purpose of this study and received copies of the Letter of Invitation and Parental/3rd Party Consent Forms for distribution. Once the Parental/3rd Party Consent Forms were filled out and collected by program leaders, the researchers were able to visit the site.

Upon arrival at the research site, Parental/3rd Party Consent Forms were collected by the researchers and Assent Forms for Minors were distributed and collected. This occurred before any data was gathered at the sites. The ethics application for the larger research project that this thesis will be analyzing data from was submitted on March 6, 2008 and accepted by the Brock University Research Ethics Board on June 12, 2008 (#07-263).

Instrumentation

The Situational Affective State Questionnaire (SASQ: Mandigo, Holt, Anderson & Sheppard, 2008) includes 22 items compiled from previously developed questionnaires. These items are measured on a seven point Likert scale ranging from “no way!” to “for sure!”. The SASQ uses these items to measure five variables directly related to Self-Determination Theory (Deci & Ryan, 1985). These variables are (1) optimal challenge, (2) intrinsic motivation, (3) perceived competence, (4) perceived autonomy, and (5) relatedness.

(1) The skill = challenge subscale of the Children's Perception of Optimal Challenge

Inventory (Mandigo, 2001; later revised by Mandigo and Sheppard, 2003) was used in the SASQ. These six items measure optimal challenge, and more specifically the "degree to which participants felt the lessons matched their abilities" (Mandigo, Holt, Anderson & Sheppard, 2008, p.412). For example, the questionnaire asked participants to rate their response to "My skills were equal to the challenge" and "It was in the middle of easy and hard".

(2) The Intrinsic Motivation Inventory (IMI: McCauley et al, 1989) includes four items used to measure interest and enjoyment. These four items were included in the SASQ to provide a measure of intrinsic motivation. For example, participants responded to "It was fun" and "I enjoyed it very much" on the scale from one to seven.

(3) The IMI (McCauley et al, 1989) also include four items that measure the competence experienced by participants. These items were included in the SASQ to measure the perceived competence of the participants. This was measured with statements such as "I was pretty good at it" and "I did it pretty well compared to others".

(4) Hagger et al. (2003) utilized a shortened version of a questionnaire designed to assess the "degree to which participants perceived others in positions of authority to be autonomy supportive" (Mandigo, Holt, Anderson & Sheppard, 2008, p. 412). Similarly, these six items were included in the SASQ to measure perceived autonomy. Participants rated their reaction to statements such as "My leader encouraged me to ask questions" and "My leader was confident in my ability to do well".

(5) Relatedness was measured by two items previously developed by Ntoumanis (2001).

These items were included in the SASQ to measure the degree to which participants felt related to others. These items included “It made me feel closer to the other kids” and “It made me feel more connected to other kids”.

In addition to these 22 items, an open-ended question was included on the back of the questionnaire. It stated, “Is there anything else you want to tell us about the activities you just did?”. Below this question participants were encouraged to write or draw in the blank space provided.

Procedures for Testing and Gathering Data

Upon arrival at the research site, once consent and assent forms were gathered, the researchers observed the participants during the PA time period of the CKC program. Immediately after the PA component was concluded the participants received the SASQ and were asked to complete it individually. In some instances the SASQ was completed at the same location as the PA component, and in other situations the SASQ was administered minutes later at the program’s home room. Participants each received one copy of the SASQ, and a writing utensil and proceeded to record their responses. If the participants asked for assistance in understanding the items of the SASQ, the researchers attempted to help the participant understand any of the questions in the questionnaire. Only those participants 8-12 years of age were asked to complete the SASQ.

Treatment of the Data

The data collected by the SASQ was coded and inputted into Microsoft Excel. The data was then saved in an Excel spreadsheet and transferred to SPSS, a data analysis program. This same program was used to conduct the secondary data analysis required for this study. Initially, descriptive statistics will be used to summarize the responses of the participants to the measures in the SASQ. Frequency distribution, central tendency and variability of distribution will be calculated for each item of the SASQ and each of the five constructs of the questionnaire. These descriptive statistics will also be calculated with gender groups and age groups. In previous studies, to explore the factorial structure of the five subscales of the SASQ, an Exploratory Factor Analysis (EFA) has been conducted (Mandigo, Holt, Anderson & Sheppard, 2008). Likewise, in this study an EFA will be conducted to examine the SASQ's reliability and validity within this sample. For this study's research question, the data analysis techniques will be explained below.

Research Question 1:

While controlling for gender and age, are there significant differences between the treatment (CKC program participants) and control (non-CKC) groups on their responses to each of the five measures of the SASQ after four (4) months of participation and after eight (8) months of participation?

A Multivariate Analysis of Co-Variance (MANCOVA) was conducted to assess if there was a significant difference between the four (4) month treatment and four (4) month control

group participants and their scores on the five measures of the SASQ. The MANCOVA also assessed if there was a significant difference between the eight (8) month treatment and eight (8) month control group participants and their scores on the five measures of the SASQ. The analysis included age and gender as covariates.

To draw inferences from this sample it is important to assess its power and effect size. These values were calculated to assess the size and importance of the effect of the intervention, and also assess if the study had sufficient power to detect any effects that might exist (Cohen, 1992; Field, 2005).

Chapter 4

Data Analysis

Grounded in Self-Determination Theory (Deci & Ryan, 1985), this survey based study investigated children's motivational experiences arising from participation in the PA component of the CKC program. This research assessed the intrinsic motivation, perceived competence and perceived autonomy experienced by the participants immediately after participation in the PA component. This information will provide a more complete understanding of what children's affective reactions are to the PA component of the CKC program and provide possible insights into the development of self-determined motivation in the PA component of this program.

The research objectives of this study included: (1) conducting a principal component analysis (PCA) of the SASQ to examine the reliability of the subscales when used for this sample of school-aged children; and (2) to determine if there are any significant differences in the reliable constructs of the SASQ between treatment and control groups, and between four and eight month groups, while controlling for age and gender.

Data Screening

Prior to conducting data analysis, several steps were taken to ensure the accuracy of the data. As stated in the ethics application, signed consent and assent forms were required from each participant. The data used for this study was secondary data, however

to ensure each participant's data was acceptable for analysis, the original consent, assent and SASQ paper copies were reviewed. All surveys without consent and assent forms were removed from the study. Initially, 25% of the original SASQ surveys were randomly reviewed to ensure data input had been correctly conducted. As there were errors in data input, all SASQ surveys were reviewed and the originals were compared to the data inputted to ensure accuracy. The data was also examined in SPSS for outliers and corrections were not necessary.

Since some surveys were incomplete, missing data patterns were examined. As there are no firm guidelines on the amount of acceptable missing data based on sample size (Tabachnik & Fidell, 2007), the amount of incomplete cases could be ignored. Indeed, when examining the amount of missing data by variable, only three variables had more than 5% of their data missing. A generally practiced rule of thumb (Hair, Black, Babin, Anderson & Tatham, 2006) states that missing data under 10% for observations can be ignored. As no variables had missing data greater than 10% and there was no concentration of missing data in specific questions, nor attrition at the end of the questionnaire, the amount of missing data in each variable could be deemed acceptable. However, of the 22 survey items, only two variables had complete data across all cases. When examining the missing data by case, 58 of the 79 cases completed their survey, leaving 26.6% of the participants with incomplete surveys. If the analysis were to be conducted listwise the data would be reduced to less than 75% of its original participants and such a small data set would not be sufficient for the analysis techniques required in this study. Therefore, the missing data used for the principal component analysis and the

MANCOVA was remedied by imputing replacement means for each missing data value (Hair et al., 2006). For the descriptive statistics reported below, the raw scores of the responses of the participants are reported, without means imputed.

Background Demographics

Of the 79 participants in this study, 54.4% (n=43) were male, and 45.6% (n=36) were female. Of those participants, 45.6% (n=36) were nine years of age and the majority (n=64, 81%) were in grades three or four. When examining the treatment and control conditions of this study, 72.2% (n=57) were in the treatment condition and 27.8% (n=22) were in the control condition. Of the participants in the treatment condition, 17.5% (n=10) completed the study after four months in the CKC program, and 82.5% (n=47) completed the SASQ after eight months. In the control condition 36.4% (n=8) completed the questionnaire after four months, and 63.6% (n=14) completed it after eight months (refer to Table 1.0 on the next page for results).

The Situational Affective State Questionnaire (SASQ)

The SASQ is comprised of 22 items assessing each participant's perceived autonomy, competence, relatedness, intrinsic motivation and optimal challenge. All items were measured on a 7-point Likert scale ranging from 1 = 'No Way!!' to 7 = 'For Sure!!'. Six items within the SASQ assess each participant's perceived autonomy. The majority of the participants agreed highly with the statement "I felt understood by my leader" (M=5.12, SD=1.93) and participants also scored highly in their responses

Table 1.0

Background Demographics

Characteristic	<u>N</u>	%
<i>Gender</i>		
Male	43	54.4
Female	36	45.6
<i>Age (years)</i>		
8	14	17.7
9	36	45.6
10	19	24.1
11	10	12.7
<i>Grade</i>		
3	34	43
4	30	38
5	9	11.4
6	6	7.6
<i>Condition</i>		
Treatment	57	72.2
Control	22	27.8
<i>Time Period</i>		
Four months	18	22.8
Eight months	61	77.2

Demographic Characteristics of Participants (N=79)

to "My leader gave me choices and options" ($M=4.64$, $SD=2.14$). All of the items measuring autonomy had slightly higher scores, as four of the six items had a negative skewness (refer to Table 1.1 on the next page for results).

*Table 1.1**Mean scores for Perceived Autonomy items*

Item	<u>M</u>	<u>SD</u>	Skewness	Kurtosis
My leader encouraged me to ask questions.	3.81	2.19	0.083	-1.524
I felt understood by my leader.	5.12	1.93	-0.953	- 0.137
My leader listened to how I would like to do things.	4.49	2.1	-0.376	-1.051
My leader was confident in my ability to do well.	4.91	2.1	-0.679	-0.845
My leader gave me choices and option.	4.64	2.14	-0.449	-1.169
My leader tried to understand how I saw things before suggesting a new way to do things.	4.04	2.19	0.042	-1.342
All items measured on a 7-point Likert scale ranging from 1 = 'No Way!!' to 7 = 'For Sure!!'				

For the items measuring perceived competence, each of the skewness scores were negative, as the scores for each of the items were high ($M > 5.4$). In fact the average score for item 22 labelled "I was pretty skilled" was extremely high ($M = 6.14$, $SD = 1.4$). The distribution for item twenty-two labelled "I was pretty skilled" and for item six labelled "I was pretty good at it" also were very peaked with the two highest kurtosis values in the data set ($K > 2.4$; refer to Table 1.2 on the next page for results).

*Table 1.2**Mean scores for Perceived Competence items*

Item	<u>M</u>	<u>SD</u>	Skewness	Kurtosis
I was pretty good at it.	5.96	1.45	-1.621	2.439
I did it pretty well compared to others.	5.43	1.81	-1.241	0.682
I was satisfied with my ability.	5.43	1.99	-1.227	0.252
I was pretty skilled.	6.14	1.4	-1.91	3.274

All items measured on a 7-point Likert scale ranging from 1 = 'No Way!!' to 7 = 'For Sure!!'

Two items from the SASQ measured perceived relatedness. The average scores for participants on "It made me feel closer to the other kids" and "It made me feel more connected to other kids" are not of very significant importance as signified by the strong negative kurtosis scores, the distribution was platykurtic and demonstrated a uniform distribution (refer to Table 1.3 below for results).

*Table 1.3**Mean scores for Perceived Relatedness items*

Item	<u>M</u>	<u>SD</u>	Skewness	Kurtosis
It made me feel closer to the other kids.	3.97	2.2	-0.044	-1.434
It made me feel more connected to other kids.	4.07	2.16	-0.079	-1.358

All items measured on a 7-point Likert scale ranging from 1 = 'No Way!!' to 7 = 'For Sure!!'

Intrinsic motivation was measured using four items. All mean scores for these items were high ($M > 5$), and all items were negatively skewed. The item “It was fun” scored the highest of all the intrinsic motivation items ($M=5.59$, $SD=1.71$), and was the second highest score overall (refer to Table 1.4 below for results).

Table 1.4

Mean scores for Intrinsic Motivation items

Item	<u>M</u>	<u>SD</u>	Skewness	Kurtosis
It was fun.	5.59	1.71	-1.159	0.463
I enjoyed it very much.	5.35	1.95	-1.080	-0.027
I would describe it as very interesting.	5.09	1.98	-0.740	-0.688
It was very enjoyable.	5.40	1.92	-1.082	0.017
All items measured on a 7-point Likert scale ranging from 1 = ‘No Way!!’ to 7 = ‘For Sure!!’				

The final construct, optimal challenge, was measured using six items within the SASQ. The item with the lowest score “It was in the middle of easy and hard” had a mean of 4.22 ($SD=2.25$) and had a negative skewness value, just like the rest of the optimal challenge items (refer to Table 1.5 on the next page for results).

*Table 1.5**Mean scores for Optimal Challenge items*

Item	<u>M</u>	<u>SD</u>	Skewness	Kurtosis
It was not too easy and not too hard.	4.66	2.07	-0.329	-1.219
My skills were equal to the challenge.	5.32	1.81	-0.969	0.066
It was challenging, but I could still do it.	4.46	2.4	-0.339	-1.556
It was a good challenge that I could do.	5.42	1.82	-1.084	0.256
It was in the middle of easy and hard.	4.22	2.25	-0.243	-1.435
The challenge was perfect for my skill level.	5.03	2.14	-0.787	-0.765
All items measured on a 7-point Likert scale ranging from 1 = 'No Way!!' to 7 = 'For Sure!!'				

The Constructs of the SASQ

As the SASQ had not been used in an after-school CKC setting, an exploratory factor analysis using a principal components analysis (PCA) with an oblimin rotation was conducted to search for structure among the set of variables from this sample. A PCA attempts to correlate each item of a survey with a factor or construct, thereby reducing for this study a dataset of 22 variables into a smaller and more manageable dataset with fewer variables. The PCA is useful as it can identify a new set of variables, which can “retain the nature and character of the original variables, but reduce their number to simplify the subsequent multivariate analysis” (Hair et al., 2006, p. 109). During a PCA, the factor structure can also be improved through a technique called factor rotation.

Factor rotation is used to discriminate between factors as it can improve interpretation (Field, 2005). There are two types of factor rotations that can be used when conducting PCA. As the SASQ is based on the SDT, a theory which states that the concepts of autonomy, competence, relatedness, intrinsic motivation and optimal challenge are all inter-related (Deci & Ryan, 1985), it can be assumed that the factors derived from this data set may also correlate with each other. The literature states that in this instance, a more accurate and realistic factor structure will be produced if an oblique rotation (oblimin rotation) is utilized as it allows the factors to relate to one another (Fabrigar et al., 1999; Fields, 2005; Hair et al., 2006; Mahoney, Thombs & Howe, 1995).

To ensure the accuracy of the PCA, the data must first be tested for singularity problems and multicollinearity. Extreme multicollinearity – the presence of variables that are very highly correlated – and singularity – variables that are perfectly correlated – should be avoided in factor analysis as it diminishes the ability to define a variable's effects. For this dataset the Kaiser-Meyer-Olkin measure of sampling adequacy was at a good value ($KMO=0.791$) and it could be concluded that the patterns of correlations are compact, therefore factor analysis would result in distinct and reliable factors (Kaiser, 1974; Hutcheson & Sofroniou, 1999). Bartlett's test of sphericity was also conducted and the Chi-Square value was significant and greater than zero ($\chi^2=536.1$, $p=0.000$), demonstrating that appropriate factor analysis can be conducted using this dataset. Further analysis displayed the determinant of the R-matrix was greater than 0.00001 (det. = 0.001) and confirmed that there is no presence of multicollinearity or singularity problems in this study.

For the initial PCA, five eigenvalues were calculated that were greater than one. Using Crocker and Algina's (1986) recommendations for accepting factors with eigenvalues greater than one, the 22 items of the SASQ loaded onto five constructs. As all variables in a PCA are assigned factor loadings on each factor, the rotated factor solution can be comprised of variables that load strongly on two or more factors at the same time. In this analysis, many of the items cross loaded onto multiple constructs at high correlation values (factor loading > 0.4). Upon further inspection, it became apparent that all items designed to measure optimal challenge were cross loading onto other factors at moderate or high correlational levels. As well, all items originally designed to measure relatedness loaded onto the factor that contained all of the autonomy items (see Table 1.6 below for results).

As the items used to measure optimal challenge and relatedness are newer measures than those of autonomy, competence or intrinsic motivation, it is conceivable that they have not had the opportunity to be refined to the same degree as the other three variables. Theoretically, this situation can be explained by referring back to the literature discussed in Chapter Two. It is understandable that the items for optimal challenge and relatedness loaded onto other factors as these two constructs are very strongly interrelated with the other three constructs of autonomy, competence and intrinsic motivation. A review of literature showed that intrinsic motivation leads to a level of optimal challenge that can fulfill all three basic needs outlined in the SDT (Frederick-Racascino, 2002). Vallerand (2000) also found that the need for relatedness may play a more remote function in certain types of activities, akin to the explanation by Ryan and Deci (2000b)

Table 1.6

Summary of items and factor loadings for five-factor solution (N=79)

Item	Factor loadings				
	1	2	3	4	5
The leader tried to understand how I saw things before suggesting a new way to do things.	.754				
It made me feel more connected to other kids.	.749				
The leader gave me choices and options.	.724				
My leader listened to how I would like to do things.	.712				
It made me feel closer to the other kids.	.497				
My leader encouraged me to ask questions.	.453				.575
My leader was confident in my ability to do well.	.401	.417			
I was pretty skilled.		.686			
It was a good challenge that I could do.		.669			
I did it pretty well compared to others.		.669			
I was satisfied with my ability.		.623			
I was pretty good at it.		.601			
The challenge was perfect for my skill level.		.520			
My skills were equal to the challenge.		.515			
It was challenging, but I could still do it.			.776		
It was in the middle of easy and hard.			.541		.530
I would describe it as very interesting.			.483		
It was fun.				-.873	
I enjoyed it very much.				-.832	
It was very enjoyable.				-.786	
It was not too easy and not too hard.					.778
I felt understood by my leader.					.630

Note. All coefficients with absolute value <0.4 are not shown in this table

that the role of relatedness in fostering intrinsic motivation is as a constant, but sometimes distal role.

Through this analysis, it became evident that the situation of the items of relatedness and optimal challenge cross loading onto other factors “serves to undermine factor uniqueness” (Mahoney et al., 1995, p.6). Therefore to enhance communality within individual factors, and to further improve uniqueness between factors (Mahoney et al., 1995), only the 14 SASQ items that did not cross-load at high correlational values were selected. A second PCA was conducted with these 14 variables.

The second PCA was conducted excluding the eight items for optimal challenge and relatedness and selecting those items designed to measure autonomy, competence and intrinsic motivation. This second PCA resulted in a three factor solution with unique factors and strong correlational strength (refer to Table 1.7 below for results). The amount of explained variance for the three factor solution was 62.85%.

To assess the reliability of each construct or subscale, Cronbach’s alpha was calculated. Mahoney et al. (1995) suggest that each subscale should have an alpha level of 0.75 or greater to meet the criteria for acceptability. Based on this criteria, autonomy ($\alpha = 0.843$) and intrinsic motivation ($\alpha = 0.859$) had very high and acceptable reliability scores. However, competence ($\alpha = 0.72$) had an alpha level slightly below acceptable levels. In previous research conducted with the SASQ, similar results were reported, as the competence variable had a low and unacceptable alpha level (Mandigo et

Table 1.7

Summary of factor loadings for three-factor solution and coefficient alphas ($N=79$)

Item	Factor loadings
	Factor 1: Autonomy ($\alpha = 0.843$)
My leader encouraged me to ask questions.	0.778
I felt understood by my leader.	0.722
My leader tried to understand how I saw things before suggesting a new way to do things.	0.706
My leader listened to how I would like to do things.	0.636
My leader gave me choices and option.	0.608
My leader was confident in my ability to do well.	0.573
	Factor 2: Competence ($\alpha = 0.72$)
I was pretty skilled.	0.789
I did it pretty well compared to others.	0.700
I was satisfied with my ability.	0.642
I was pretty good at it.	0.609
	Factor 3: Intrinsic Motivation ($\alpha = 0.859$)
It was fun.	-0.907
I enjoyed it very much.	-0.872
It was very enjoyable.	-0.814
I would describe it as very interesting.	-0.567

al., 2008). For this study, further analysis of the reliability of the competence subscale was conducted. Alpha coefficients were calculated to assess if the subscale was more reliable if any one of the four items measuring competence were deleted. However, after analysis the alpha levels for the competence component never improved with item deletion. Therefore due to the competence subscale's alpha level being very near to the acceptable alpha level of 0.75 (dif. = 0.03) and the acceptable factor structure suggested through the PCA, the competence subscale was retained for the sake of maintaining the theoretical model.

Once the three constructs of this study were identified through the use of the PCA, three scores for each participant's overall autonomy, competence and intrinsic motivation responses were calculated from the original SASQ items. The resulting means from the three constructs were moderately high. The autonomy construct had the lowest mean ($M=4.5$, $SD=1.558$), intrinsic motivation had the greatest standard deviation ($M=5.4$, $SD=1.575$), and the competence construct had the highest mean ($M=5.7$, $SD=1.227$) (refer to Table 1.8 below for results).

Table 1.8

Mean scores for SASQ constructs

Construct	<u>M</u>	<u>SD</u>	Skewness	Kurtosis
Autonomy ¹	4.50	1.56	-0.288	-0.706
Competence ²	5.74	1.23	-0.928	0.053
Intrinsic Motivation ²	5.36	1.58	-0.907	0.035

All items based on a 7-point Likert scale ranging from 1 = 'No Way!!' to 7 = 'For Sure!!'
1 = measured using six items; 2 = measured using four items.

An Analysis of Subjective Experiences

This section describes the analysis conducted to examine if the scores of the SASQ constructs (autonomy, competence and intrinsic motivation) were significantly affected by participation in the CKC program versus a control group. This analysis also identified if the constructs were affected by the time period (four months or eight months) at which each participant was measured, and finally if the covariates (gender and age) significantly affected the scores of the SASQ constructs across all groups.

To answer these questions a Multiple Analysis of Covariance (MANCOVA) was initially conducted. A MANCOVA is able to assess group differences across multiple dependent variables, examining the linear combination of the dependant variables, and is able to control for variables that are not part of the main experimental manipulation, but have an influence on the dependent variables (Harlow, 2005; Hair et al., 2006). A MANCOVA can be very effective as it also allows researchers to look at interactions between independent variables as well as conduct contrasts to see which groups differ from each other (Field, 2005). By including covariates, the analysis is able to reduce within-group error variance and eliminate confounds (Hair et al.). To ensure the accuracy of multivariate data analysis and hypothesis testing, certain statistical assumptions must first be met. The data being analysis must meet the assumptions of (1) independence, (2) normality, (3) homogeneity of regression slopes and (4) homogeneity of covariance (Field; Hair et al.).

(1) An assumption of independence requires that the responses of each group and each participant are made independently of the responses of the other participants in other groups. For this study, effort was made to allow each participant to complete their own survey in their own timeframe, without input from other participants, and in their own workspace.

(2) The assumption of normality of the dependent variables can be measured by converting the skewness and kurtosis values of the distribution of each variable into z-scores, as well as conducting the Kolmogorov-Smirnov (KS) and Shapiro-Wilk (SW) tests. When the KS and SW tests were performed, all three dependent variables returned significant statistics, meaning that the distribution of the three variables were significantly different than a normal distribution. The distributions of the competence and intrinsic motivation variables were very greatly negatively skewed and required correction. In order to remedy this, the scores of the three variables were transformed by cubing each score (as suggested by Hair, Black, Babin, Anderson & Tatham, 2006).

(3) To ensure that any significant relationship detected between the covariate and any of the dependant variables is correct for all groups of participants, the homogeneity of regression slopes must be measured (Fields, 2005). To determine this, the interaction effects of the covariates with the independent variables were measured. In all groups for this study there was no significance ($p > 0.05$) therefore the assumption of homogeneity of regression slopes can be assumed.

(4) To confirm the assumption of homogeneity, Box's M test of equality of covariance matrices was conducted. The significance for this test was greater than 0.05 ($BM=13.145$, $p=0.874$) and supported homogeneity of covariance in the data set. This test was very important as the sample sizes were not equal between groups. To strengthen this assumption the Levene's test of equality of error variances was also conducted and the significance for all three dependant variables was again greater than 0.05 (Autonomy: $F=1.578$, $p=0.202$; Competence: $F=1.815$, $p=0.152$; Intrinsic Motivation: $F=0.112$, $p=0.953$). The result of these two tests showed that the multivariate statistics from this analysis were robust, and also demonstrated that there was confidence in the reliability of the univariate tests conducted in this analysis.

For this study, a MANCOVA was conducted with four months versus eight months (FvE), and treatment versus control (TvC) as the independent variables, the measures of autonomy, competence and intrinsic motivation as the dependent variables, and gender and age as the covariates. The overall multivariate test of group differences for the variable of treatment versus control was not significant (Pillai's trace=0.029, $F(3, 71)=0.716$, $p=0.546$, partial eta-squared=0.029, power=0.195) indicating that the adjusted linear combination of dependent variables were not significantly affected by participation in the treatment or control condition. The multivariate test of group differences between four months and eight months was also not significant (Pillai's trace=0.071, $F(3, 71)=1.814$, $p=0.152$, partial eta-squared=0.071, power=0.453) indicating that the adjusted linear combination of dependent variables were not significantly affected by time of

measurement of the SASQ (at four months or eight months in the program). The multivariate test also measured the ability of the covariates to adjust the dependent variables. When controlling for both age and gender, the covariates did not provide significant adjustment. The multivariate test did show a high F value for gender, however the test was not significant ($F=2.549$, $p=0.063$) and from this analysis it appears that taking account of the covariates of age and gender did not provide a purer measure of the effect of the experimental manipulation. Overall, these results show a failure to reject the null hypothesis and it can be concluded that there is no significant differences for the linear combination of the scores of the three dependent variables between any of the groups (refer to Table 1.9 below for results).

Table 1.9

Multiple analysis of covariance of three SASQ construct scores as a function of treatment versus control condition and four versus eight month groups with gender and age as covariates

Variable	<u>F</u>	Significance (p)	Effect size	Power
Covariate – Age*	1.030	0.385	0.042	0.268
Covariate – Gender*	2.549	0.063	0.097	0.606
Treatment vs. Control condition (TvC)*	0.716	0.546	0.029	0.195
Four vs. Eight month group (FvE)*	1.814	0.152	0.071	0.453
TvC x FvE*	1.253	0.297	0.050	0.322

* Pillai's Trace, Wilks' Lambda, Hotelling's Trace and Roy's Largest Root were all calculated and returned identical values for each variable.

One strength of conducting a MANCOVA is its ability to protect against inflated Type I error rates (Field, 2005). Specifically, a MANCOVA is able to protect the dependent variables. Because of this protection, a MANCOVA was originally suggested for this study. While the MANCOVA was useful in assessing if there were any differences of the linear combination of the SASQ scores between the groups of CvT, and FvE, it did not address the research questions directly. As the MANCOVA assessed the differences of the linear combination of the variables, the interpretation of the results did not yield findings for each variable independently of the others. In addition, the MANCOVA examined differences between the large group of treatment versus control, without differentiating between the four month group and the eight month group. It became evident after the MANCOVA's execution that further analysis would be required. Therefore to analyse the differences of each of the dependent variables, within each group, analysis of covariance (ANCOVA) tests were performed. Unfortunately, conducting multiple ANCOVAs does not have the protection of a MANCOVA, and can inflate the Type I error rate. Therefore a Bonferroni correction was required to adjust the significance level. This adjustment was calculated based on the number of times the dependent variables were tested (Tabachnick & Fidell, 2007). As each dependent variable was included in two ANCOVAs, the Bonferroni adjustment was set at $p \leq 0.025$ [$(p=0.05) / 2 = 0.025$].

ANCOVAs were performed to assess if there were any differences for the scores of the three dependent measures of autonomy, competence and relatedness between the groups of: (1) four month treatment versus four month control, and (2) eight month

treatment versus eight month control, all while controlling for age and gender. As outlined in the MANCOVA analysis previously described in this chapter, all data for each analysis must meet the assumptions of independence, normality, homogeneity of regression slopes and homogeneity of covariance (Field, 2005; Hair et al., 2006). For each ANCOVA described below, the variables of autonomy, competence and relatedness were transformed and cubed, and as a result, all statistical assumptions were met.

From the dataset, three separate ANCOVAs were conducted to measure the differences of the dependent variables of autonomy, competence and intrinsic motivation between the group of the independent variable of four month treatment versus four month control, while controlling for the covariates of age and gender. The test of between subject effects indicated that there was no significant difference in the scores of competence ($F=0.076$, $p=0.786$, partial eta-squared=0.005, power=0.058), intrinsic motivation ($F=0.454$, $p=0.511$, partial eta-squared=0.031, power=0.096) and autonomy ($F=0.457$, $p=0.510$, partial eta-squared=0.032, power=0.097) between the treatment versus control groups (refer to Table 2.0 below for results). There was no significant adjustment when controlling for age on the variables of autonomy ($F=0.211$, $p=0.653$, partial eta-squared=0.015, power=0.071), competence ($F=1.744$, $p=0.208$, partial eta-squared=0.111, power=0.234) and intrinsic motivation ($F=0.045$, $p=0.835$, partial eta-squared=0.003, power=0.055). When controlling for gender, there was no significant adjustment on the variables of autonomy ($F=0.057$, $p=0.815$, partial eta-squared=0.004, power=0.056), competence ($F=2.244$, $p=0.156$, partial eta-squared=0.138, power=0.287) and intrinsic motivation ($F=0.624$, $p=0.443$, partial eta-squared=0.043, power=0.114).

Table 2.0

Analysis of covariance for the four month treatment versus four month control groups with gender and age as covariates

Variable	F	Significance (p)	Effect size	Power
<i>Covariate – Age</i>				
Competence	1.744	0.208	0.111	0.234
Intrinsic Motivation	0.045	0.835	0.003	0.055
Autonomy	0.211	0.653	0.015	0.071
<i>Covariate – Gender</i>				
Competence	2.244	0.156	0.138	0.287
Intrinsic Motivation	0.624	0.443	0.043	0.114
Autonomy	0.057	0.815	0.004	0.056
<i>Four month treatment vs four month control</i>				
Competence	0.076	0.786	0.005	0.058
Intrinsic Motivation	0.454	0.511	0.031	0.096
Autonomy	0.457	0.510	0.032	0.097

Three similar ANCOVAs were conducted to assess the differences of the scores of the dependent variables of autonomy, competence and intrinsic motivation between the group of eight month treatment versus eight month control, while controlling for the covariates of age and gender. The resulting ANCOVAs displayed no significances as the test of between subject effects indicated that there was no significant difference in the scores of competence ($F=1.288$, $p=0.261$, partial eta-squared=0.022, power=0.200), intrinsic motivation ($F=0.105$, $p=0.747$, partial eta-squared=0.002, power=0.062) and autonomy ($F=0.160$, $p=0.691$, partial eta-squared=0.003, power=0.068) between the treatment versus control groups (refer to Table 2.1 on next page for results). There was

no significant adjustment when controlling for age on the variables of autonomy ($F=0.600$, $p=0.422$, partial eta-squared=0.010, power=0.119), competence ($F=0.021$, $p=0.886$, partial eta-squared=0.000, power=0.052) and intrinsic motivation ($F=0.149$, $p=0.701$, partial eta-squared=0.003, power=0.067). When controlling for gender, there was no significant adjustment on the variables of autonomy ($F=0.291$, $p=0.592$, partial eta-squared=0.005, power=0.083), competence ($F=0.750$, $p=0.390$, partial eta-squared=0.013, power=0.136) and intrinsic motivation ($F=0.542$, $p=0.465$, partial eta-squared=0.009, power=0.112).

Table 2.1

Analysis of covariance for the eight month treatment versus eight month control groups with gender and age as covariates

Variable	F	Significance (p)	Effect size	Power
<i>Covariate – Age</i>				
Competence	0.021	0.886	0.000	0.052
Intrinsic Motivation	0.149	0.701	0.003	0.067
Autonomy	0.600	0.442	0.010	0.119
<i>Covariate – Gender</i>				
Competence	0.750	0.390	0.013	0.136
Intrinsic Motivation	0.542	0.465	0.009	0.112
Autonomy	0.291	0.592	0.005	0.083
<i>Eight month treatment vs eight month control</i>				
Competence	1.288	0.261	0.022	0.200
Intrinsic Motivation	0.105	0.747	0.002	0.062
Autonomy	0.160	0.691	0.003	0.068

At the end of the SASQ survey, the participants were asked “Is there anything else you want to tell us about the activities you just did?”. The comments from this open-ended question were recorded to attempt to gain a better understanding of the experiences of the participants. Of the 79 participants in this survey, there was a response rate of 16.5%, with only 13 participants providing comments. Seven of the comments included the word “fun” and all comments were neutral or positive. After review of the comments, no consistent themes were identified and it was not possible to develop significant categories of any kind. No further analysis was conducted with this data. For a review of the responses to the SASQ please refer to Table 2.2 below.

Table 2.2

Summary of all written responses to SASQ

Comment
1. Thank you very much it was fun.
2. Octopus was my favourite game. It was fun. I also like tag.
3. No.
4. Cat and mouse game was the best. It was fun.
5. <participant name>*
6. Skipping was fun and so was soccer, and I liked running.
7. No thanks gest <just> I had cind <kind> of fun.
8. Catch is fun and awesome with all the conslers <counsellors>.
9. I think the activities were very good and got me more active.
10. Soccer is best in YMCA and Bball
11. We do fun activities when it is free time like football, soccer, basketball and KCC <CKC> has these games that are fun: tag, soccer.
12. No but thank you.
13. They are fun!!!! LOL. Rock on!

* For reasons of confidentiality and anonymity the participant’s name has been removed from this comment.

Summary of Findings

For this study, an exploratory factor analysis was first conducted to search for structure and common factors among the items of the SASQ within this sample. An initial five factor solution was provided, however many of the 22 items of the SASQ were correlated with more than one factor. To achieve a clean factor solution, the eight items measuring optimal challenge and relatedness were removed and the factor analysis was conducted again. The second analysis resulted in an appropriate three factor solution, with the 14 remaining items loading onto the three factors labelled autonomy, competence and intrinsic motivation. The participants' means for each of these constructs were then calculated.

In order to initially assess if there was a significant difference in the scores of the three dependent variables, a MANCOVA was conducted. To correctly run this analysis, the three dependent variables had to be transformed to ensure they met the multivariate assumptions of normality. Upon completion of the MANCOVA there were no significant differences reported for the linear combination of the scores of autonomy, competence and relatedness when examined by control or treatment group, four or eight month group, or when controlling for the covariates gender and age. However, the MANCOVA only assessed the differences by the grouping variables. To further assess the differences between groups, six ANCOVAs were conducted. These subsequent ANCOVAs all resulted in no significant differences for any of the dependant variables when controlling for age or gender, or between the groups of (1) four month treatment

versus four month control, and (2) eight month treatment versus eight month control.

The comments recorded on the back of the SASQ were not helpful to the analysis proposed in this study and no results were gathered from this data. Overall, these findings suggest that for the scores of autonomy, competence and intrinsic motivation, it did not matter if a participant was in the CKC program or the control group, nor how long they participated in the CKC program or the control group. Even after taking into account a participants age and gender, their scores on these three constructs were not significantly different.

Chapter 5 - Discussion

Introduction

The purpose of this study was to investigate children's motivational experiences, specifically if intrinsic motivation, perceived competence and perceived autonomy was experienced as a result of participation in the PA component of the CKC program. Using the theoretical perspective of SDT (Deci & Ryan, 1985), the data gathered by the SASQ was used to address questions based around the participant's motivational experiences and possibly link these motivations to those established in literature to promote adherence and persistence in PA. To accomplish this, a PCA of the SASQ was conducted to determine common factors (constructs) and examine the reliability of these factors when used for this sample of school-aged children. Analysis was then conducted to determine if there were any significant differences in the reliable constructs of the SASQ between treatment and control groups, and four and eight month groups, while controlling for age and gender.

Research Objective One – Principal Component Analysis

This was the first study utilizing the SDT perspective to examine the after-school CKC program environment, and as data was gathered for many variables a PCA was conducted to reduce the dataset to only the common factors. The PCA produced an initial solution with five factors that were not unique. Therefore the items measuring the variables of relatedness and optimal challenge were removed.

There was some difficulty while conducting the initial PCA due to some of the items from the data set loading onto multiple factors at high correlational values. As stated earlier, the items designed to measure competence, autonomy and intrinsic motivation each loaded onto their own factor at high correlational values. However the items measuring relatedness did not load onto a unique factor but loaded onto the autonomy factor. This is understandable as the literature recommends that when conducting a PCA at least three to five items should be used to represent a factor (MacCallum et al., 1999; Velicer & Fava, 1998). In this study only two items measured relatedness and therefore the recommended requirement for ‘overdetermining’ each concept in order to produce a unique and reliable factor was not present (Fabrigar et al., 1999).

Optimal challenge also did not load onto a unique factor of its own as the six items were dispersed between all five factors. This may be explained by the theoretical knowledge that optimal challenge is highly correlated with the other SDT constructs examined here. The literature reports that optimal challenge is a consequence of satisfying the needs for autonomy and competence (Deci & Ryan, 1985), and is also closely linked to intrinsic motivation (Csikszentmihalyi, 1990; Poulsen, Rodger, & Ziviani, 2006). A second explanation may be possible by examining the origins of the SASQ items. The intrinsic motivation and competence items were developed in 1989 as a part of the Intrinsic Motivation Inventory (IMI: McAuley, Duncan & Tammen, 1989) and have been tested and revised many times with many different samples. Likewise, the items measuring autonomy, although more recently developed have been tested and

revised through use in many different samples and studies (revised in Brickell, Chatzisarantis, & Pretty, 2006; Baard, Deci & Ryan, 2000 as cited by Hagger et al., 2003; Deci, 2001). When examining the items measuring optimal challenge, they originated in 2001 as part of the Children's Perceptions of Optimal Challenge Inventory (CPOC: Mandigo, 2001 as cited by Mandigo et al., 2008) and have also undergone a revision in published work (Mandigo & Sheppard, 2003). However, in comparison to the other subscales, the optimal challenge subscale has been used mostly in the Physical Education context. It is possible that the current items of the SASQ designed to measure optimal challenge did not load onto a unique factor for this study as they have not had the opportunity to be revised for use with a sample from environments such as the after-school setting or the PA component of the CKC.

After the first PCA was conducted ineffectively, a second successful PCA was conducted. This PCA was able to reduce 14 variables from this data sample into three variables measuring autonomy, competence and intrinsic motivation. Analysis of the variables of autonomy and intrinsic motivation revealed that they were reliable, however the alpha coefficient for competence ($\alpha = 0.72$) was just below the acceptable levels of $\alpha = 0.75$. In a previous study using the SASQ, similar results were found as the reported alpha level for competence was 0.44 (Mandigo et al., 2003). In that study the competence variable "was retained for the sake of maintaining the theoretical model (and due to the acceptable factor structure)" (p. 413). As the PCA in this study also produced an acceptable factor structure, the competence variable was retained in this study, following the example of Mandigo and colleagues.

While the competence variable was retained in both this study and the study presented by Mandigo and colleagues (2003), there was a difference in the execution of the PCA between the two studies. In the study by Mandigo and colleagues, the factor structure was improved with an orthogonal factor rotation (varimax rotation). This rotation ensures the factors remain independent of each other, and provided a more clear and interpretable factor solution (Field, 2005). While this is the most commonly used factor rotation in current studies, an oblique rotation was used for this study instead. As the SASQ is based on the constructs of the SDT, which are all posited to be inter-related (Deci & Ryan, 1985), there was good theoretical reason to adopt an oblique factor rotation and allow the factors to correlate with each other. This decision is supported by Pedhazur and Schmelkin (1991 as cited by Field, 2005) who state that if an oblique rotation reveals a correlated factor solution, the orthogonally rotated solution should be discarded.

An interesting finding was revealed through the PCA conducted in this study. As the final factor solution was completed using an oblimin rotation, the three constructs were allowed to correlate with each other, as supported by the theoretical tenets of SDT (Deci & Ryan, 1985) and PCA literature (Fabrigar et al., 1999). Although the autonomy and competence variables correlated with each other at a value of 0.225, the variables of autonomy and competence both correlated with intrinsic motivation at higher levels (competence and intrinsic motivation = -0.355; autonomy and intrinsic motivation = -0.378). The findings from this analysis suggest a relationship repeatedly reported in SDT literature. It is understandable that the constructs of autonomy and competence had

higher correlational values with intrinsic motivation than each other because within the SDT framework, self-determined motivation and specifically intrinsic motivation is experienced as a result of the satisfaction of psychological needs such as competence and autonomy (Deci & Ryan, 1985; Ryan & Deci, 2002; Vallerand, 2000).

Research Objective Two – Analysis of Subjective Experiences

Once the three constructs of autonomy, competence and intrinsic motivation were identified through the PCA, the participants' scores for these constructs were calculated and assessed for between group differences. Initially, a MANCOVA was conducted and demonstrated that there was no significant differences for the linear combination of the scores of the three constructs between any of the groups. When controlling for gender a significance level of $p=0.063$ was reported. This may indicate that the scores of males and females in this study were different from each other. However, although this value is close to the acceptable level of 0.05, it is not significant and therefore it is possible that the difference reported between males and females in this study was due to random chance alone.

After completion of the MANCOVA, separate ANCOVAs for each of the constructs were performed for each group of (1) four month treatment versus four month control, and (2) eight month treatment versus eight month control, all while controlling for age and gender. After all six ANCOVAs were conducted there were no significant differences between any groups for the scores of any of the constructs while controlling for age or gender. It is important to note the power of the analysis (i.e. the probability of

avoiding a Type II error), or appropriately rejecting the null hypothesis (Cohen, 1992), for each ANCOVA was very weak and did not meet the generally accepted level of 0.80 (Cohen). In fact, the requirements to reach a power level of 0.80 were not present in this study. Due to the small sample sizes utilized for the ANCOVAs (ranging from N=18 to N=61) there was an increased chance of a Type II error, resulting in the possibility that for this study the decision of failure to reject the null hypothesis for all analyses may be incorrect (Cohen). Cohen suggests that when conducting an ANCOVA between two groups, with a medium effect size and a significance level of $p < 0.05$, a sample size of at least 64 is required to reach the generally accepted power level of 0.80. The sample sizes in this study were not sufficient to obtain a power level of 0.80 for the ANCOVA analyses conducted in this study.

Although there were no significant differences between any of the groups within this study, there were notable results. When examining the means of the competence, autonomy and intrinsic motivation constructs, all three scores were at or above 4.5 (on a Likert scale from one to seven). These means show that of the participants studied, all of whom were attending an after-school YMCA or BGC childcare setting, the participants experienced moderate to high levels of autonomy support, competence and intrinsic motivation. Although there were no significant differences between control or treatment groups, this example strengthens the theory that as a whole, the after-school childcare environment provides an opportunity to foster self-determined motivations. These same self-determined motivations have been linked in literature to persistence and adherence to healthy PA behaviours (Deci & Ryan, 2008; Gillson, Standage & Skevington, 2006;

Kilpatrick, Hebert & Jacobsen, 2002; Ntoumanis, 2001). This encouraging finding implies that the after-school childcare setting is an opportune environment for further implementation of PA interventions and strategies.

The findings from this study also lend support to the literature regarding gender differences in PA motivation. Although social influences can contribute to differences in motives for each gender, the SDT posits that theoretically, the psychological needs for competence, autonomy and relatedness do not differ between males and females (Deci & Ryan, 1985; Frederick-Racascino, 2002). Specifically in sports and exercise, males have been shown to be more intrinsically motivated to engage in PA and females more extrinsically motivated (Frederick-Racascino; Gillison et al., 2009). However, Rhodes, Blanchard and Blacklock state that within the PA context, there does not appear to be a need to adapt theoretical models based on gender (2008). In fact, the literature has repeatedly found that there are no gender differences for interest/enjoyment, competence and social motives such as relatedness (Frederick & Morrison, 1996; Frederick, Morrison & Manning, 1996; Frederick-Racascino, 2002). The findings from this study have supported the invariance of gender reported in the literature, showing that intrinsic motivation (interest/enjoyment) and competence did not significantly differ by gender. Therefore, if practitioners are attempting to promote self-determined motivations during the implementation of the CKC program, the results of this study indicate that variations in programming due to the gender of the participants are not necessary.

The results from this study showed that there was moderate to high levels of intrinsic motivation, competence and autonomy reported by the participants after participation in the PA component of the CKC, which did not differ between the group they were in (control or experimental) or the participants' age or gender. These findings should be taken into consideration by Childcare practitioners as they demonstrate that the PA component of a childcare setting, with or without a PA intervention being implemented, is capable of fostering moderate to high levels of self-determined motivational experiences. As the literature establishes that activities engaged in while experiencing self-determination can lead to adherence and persistence, the presence of moderate to high levels of self-determined experiences in the CKC program demonstrates that behaviours experienced during participation in this childcare setting may also persist. Childcare practitioners should be aware of this potential and design or adopt programs for their PA components that improve PA levels, health and wellness, as the children are more likely to continue to engage in the PA behaviours they practice during childcare due to the self-determined motivations they experience in this setting.

These findings can also be utilized to further the development of the CKC program. In previous studies the CKC program has been shown to significantly increase food knowledge and MVPA from baseline to post-intervention time periods in comparison to control groups (Kelder et al., 2005). Similarly, in the evaluation of the CKC in Ontario After-School Programs (CKC-Ont), the study demonstrated that the CKC was successful at providing a higher quality of PA than control schools, and a wider range of more nutritious food choices (Sharpe et al., 2009). The benefits of participation

in the CKC program are evident. However, the results from this study show that this program only fosters moderate to high levels of intrinsic motivation, autonomy and competence while providing these benefits. In fact, when analysis of focus groups from the CKC-Ont study were conducted, the participants stated that they had difficulty extending learning into the home and had only some opportunities to extend learning with peers (Sharpe et al.). In the future, the CKC program could be enriched through program revisions to increase self-determined motivational experiences, as higher levels of self-determination will lead to the persistence of the benefits this program already promotes in its participants.

There are several strategies outlined in the literature, which explain how to increase self-determined motivation in childhood programming, and encourage children to progress along the self-determination continuum, towards the ultimate goal of completely self-regulated and intrinsic motivation in PA. One strategy is based on the psychological need every child has for competence and self-confidence (Deci & Ryan, 1985). Providing positive feedback during participation in an activity can increase the perception of competence for a child, and increase their self-determined motivation (Kilpatrick, Hebert & Jacobsen, 2002). Another strategy involves setting and promoting process goals that are moderately difficult (Kilpatrick, Hebert & Jacobsen). By focusing attention on the task, rather than an outcome, and ensuring that the task is challenging, but not too difficult, the child has a chance to increase their sense of mastery and competence, while improving their autonomy. This ensures the child is evaluated based on their own improvement and not the performance of others (Kilpatrick, Hebert &

Jacobsen). Providing process goals that a child can assimilate into their values system can also encourage internalization of behaviours and increase intrinsic motivation (Poulsen, Rodger & Ziviani, 2006).

When programming activities for children, the literature states that to increase perceptions of autonomy and reduce perceptions of pressure it is important to provide choice of activities, and a rationale for performing each activity (Kilpatrick, Hebert & Jacobsen, 2002). Presenting activities and experiences as games and challenges rather than drills or exercises can enhance the opportunities for flow experiences (Poulsen, Rodger & Ziviani, 2006). As well, increasing the novelty and variety of games, and including surprises can increase intrinsic motivation and increase overall satisfaction in the activity (Poulsen, Rodger & Ziviani). Another strategy to increase a child's satisfaction, together with addressing the need for relatedness outlined in SDT, is to promote the development of social relationships. The formation of social connections can improve a child's social capital and increase enjoyment (Poulsen, Rodger & Ziviani). This can be accomplished by simply organizing more activities in pairs or groups, and practicing positive feedback.

One final strategy outlined in the research warns the practitioner to utilize rewards carefully and sparingly (Kilpatrick, Hebert & Jacobsen, 2002). Employing rewards has the ability to create pressure and coercion, and can undermine self-determined forms of motivation. Utilizing rewards to develop new behaviours can be an effective strategy, but lessening the association a child may have between an activity and a reward is

necessary as rewards should not be used to sustain existing behaviours (Kilpatrick, Hebert & Jacobsen; Poulsen, Rodger & Ziviani, 2006).

Limitations

The results from the sample in this study may not be generalizable to other childhood populations for multiple reasons. From the 330 sites that implemented the CKC program, effort was made to collect data from 60 sites that were representative of the variability in the sample's agencies, geographic location, time of implementation, type of CKC program (new or converted) and socioeconomic status (Sharpe et al., 2009). However, as stated earlier, this sample may not be representative of the population, as traditionally defined minority groups and those living in poverty are at the greatest risk of obesity and would benefit the most from PA interventions (Mahoney, Lord, & Carryl, 2005). This sample was not representative of those children living in poverty.

Also, the delivery of the program was not standardized and may have resulted in biased data. Within sample differences in facilities, location, weather and season may have affected the data (Sharpe et al., 2009). Implementation issues may have also affected the results due to inconsistency of participant attendance and different phases of program implementation. There were two phases of implementation of the CKC program for the eight month treatment group sites. They received training and equipment during phase one in May 2008, and during phase two in August 2008. This means that some leaders and study participants may have received CKC program exposure during the end of the 2007/08 school year, while all participants received CKC programming at the start

of the 2008/09 school year. Thus, there is a possibility that participation in the PA component of the CKC program occurred for more than an eight month time period for some participants. In addition, for the control groups studied, the varied knowledge and training each leader was initially equipped with, coupled with the potential influence from other inter-agency leaders and sites could have led to contamination of the control group. Care should be taken when generalizing the results of this study as these issues may have confounded the results.

The small sample size and lack of response rate for this study also limited the results. From the total of 79 participants in this survey, there was a response rate of 16.5% for the open-ended question on the back of the SASQ. Only thirteen participants provided comments. Of those, the quality of responses was poor and no meaningful results were gathered from the comments. From the 22 items gathered by the SASQ, over 26% of the participants did not complete their surveys. Problems collecting informed consent forms and limited visits to sites contributed to the smaller sample size (Sharpe et al., 2009).

Recommendations for Future Research

Future research should be conducted assessing the motivational experiences of children in a CKC setting, using a much larger sample size as the results from this small study may not have been accurate or reliable. Also, due to the inability of the PCA to identify five unique constructs from the SASQ in this sample, more studies should also be conducted in this context to determine if this questionnaire is tenable with this sample in this context. Other questionnaires such as the Motives for Physical Activity Measure –

Revised (MPAM-R: Ryan et al., 1997) could also be used in future research in this setting. The MPAM-R assesses participants' motives for engaging in PA and sport, and evaluates their experiences based on their interest/enjoyment, competence, appearance, fitness and social motives (Ryan et al.). This questionnaire could be useful as this measure has been proven reliable in linking motivation with adherence in previous research (Ryan et al.).

As this study conducted a one-time survey based assessment of the motivational experiences of the CKC participants, future research could improve the knowledge available in this field by conducting longitudinal research comparing baseline and post-intervention motivations across one or multiple school years. As the SASQ is a situational measure, designed to assess a singular event, it cannot be used to examine differences between points of time in an intervention such as the CKC. Therefore, future research should utilize different methods or questionnaires to assess the progress and effectiveness of the CKC program. Conducting a paired-samples study or using the Exercise Motivations Inventory-2 (EMI-2: Markland & Ingledew, 1997) are possible alternatives. The EMI-2 is a 51-item questionnaire designed to measure participation motivations and affective experiences on 14 subscales from the perspective of SDT. A second questionnaire that could be useful is the Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2: Markland & Tobin, 2004). This questionnaire measures the continuum of behavioural regulation as posited by SDT. Specifically, the questionnaire measures the participants' amotivation, external regulation, introjected regulation, identified regulation and intrinsic regulation with 19 items (Markland & Tobin).

In the future, in order to overcome the limitations outlined in this study, a quasi-experimental pre-test post-test study could be conducted with control and experimental groups. To improve the power and interpretability of the results, this study could employ a paired-samples design, and attempt to increase the sample size. Identifying and collecting data from the CKC after-school programs that had high attendance and doubling the number of sites studied to 120 could provide an adequate sample size. Also to minimize the chances of unknown variables confounding the results, the pre-test and post-test data could be collected at the same time during the school year. Collecting baseline research during May (at time 1), implementing the CKC program in September, and collecting post-test data twelve months after time 1, again in May, could provide more accurate findings.

Conclusion

For this study, data was collected from 79 participants using the SASQ. In order to determine the common factors present in the data, a PCA was conducted. This analysis yielded a three-factor solution reducing the data to the constructs of autonomy, competence and intrinsic motivation. Initially, to assess if there was a significant difference in the scores of the three dependent variables, a MANCOVA was conducted. Upon completion of the MANCOVA there were no significant differences reported for the linear combination of the scores of autonomy, competence and relatedness when examined by control or treatment group, four month or eight month group, or when controlling for the covariates gender and age. To further assess the differences between

groups, six ANCOVAs were conducted. These subsequent ANCOVAs all resulted in no significant differences for any of the dependant variables when controlling for age or gender, or between the groups of (1) four month treatment versus four month control, and (2) eight month treatment versus eight month control. The comments recorded on the back of the SASQ were not useful to the analysis proposed in this study and no results were gathered from this data. Overall, these findings suggest that it did not matter if a participant was in the CKC program or the control group, when examining the scores of autonomy, competence and intrinsic motivation. Nor did the scores of these three constructs differ significantly when controlling for the participants' age and gender.

The participants' perceived autonomy, competence and intrinsic motivation were not fostered in the CKC program, in relation to the control group. However, it is important to note that the CKC program was not initially designed to develop or maintain high levels of psychological need satisfaction or self-determined motivation. Although there are many benefits to assessing the participants' motivational experiences while engaged in a PA intervention such as the CKC program, the effectiveness of the CKC program should not be judged solely on the outcome of the participants' motivational experiences reported in this study. As this study is part of a larger research project, which assessed the effectiveness of the CKC program at many levels, it is also important to refer to the other findings reported by Sharpe and colleagues (2009). However, this study has demonstrated the benefits of fostering self-determined motivations in PA settings such as the CKC, as physically active lifestyles can combat the obesity epidemic currently affecting a large population of children around the world.

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Appendix A

The Situational Affective State Questionnaire (SASQ)

SITE: _____ DATE: _____ TIME: ① ② ID: _____

What Did You Think of The Activities You JUST Did?	NO WAY!!	No	Sort of Not True	Neutral	Sort of True	Yes	FOR SUPER!!
1. My leader encouraged me to ask questions.	①	②	③	④	⑤	⑥	⑦
2. It was fun	①	②	③	④	⑤	⑥	⑦
3. It was not too easy and not too hard	①	②	③	④	⑤	⑥	⑦
4. I felt understood by my leader	①	②	③	④	⑤	⑥	⑦
5. My skills were equal to the challenge	①	②	③	④	⑤	⑥	⑦
6. I was pretty good at it	①	②	③	④	⑤	⑥	⑦
7. It was challenging, but I could still do it	①	②	③	④	⑤	⑥	⑦
8. My leader listened to how I would like to do things	①	②	③	④	⑤	⑥	⑦
9. It was a good challenge that I could do	①	②	③	④	⑤	⑥	⑦
10. It made me feel closer to the other kids	①	②	③	④	⑤	⑥	⑦
11. It was in the middle of easy and hard	①	②	③	④	⑤	⑥	⑦
12. I enjoyed it very much	①	②	③	④	⑤	⑥	⑦
13. I did it pretty well compared to others	①	②	③	④	⑤	⑥	⑦
14. The challenge was perfect for my skill level	①	②	③	④	⑤	⑥	⑦
15. It made me feel more connected to other kids	①	②	③	④	⑤	⑥	⑦
16. My leader was confident in my ability to do well	①	②	③	④	⑤	⑥	⑦
17. I would describe it as very interesting	①	②	③	④	⑤	⑥	⑦
18. The leader gave me choices and options.	①	②	③	④	⑤	⑥	⑦
19. I was satisfied with my ability	①	②	③	④	⑤	⑥	⑦
20. It was very enjoyable	①	②	③	④	⑤	⑥	⑦
21. The leader tried to understand how I saw things before suggesting a new way to do things.	①	②	③	④	⑤	⑥	⑦
22. I was pretty skilled.	①	②	③	④	⑤	⑥	⑦

IF THERE IS ANYTHING ELSE YOU WOULD LIKE TO TELL US ABOUT THE ACTIVITIES, YOU CAN WRITE OR DRAW ON THE BACK.



Is there anything else you want to tell us about the activities you just did?